

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

SEPT. 13, 1954

50 CENTS

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# Aviation Week

SEPTEMBER 12, 1954

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Here a Sperry Field Engine is shown with an Air Force Observer on the operation of the Sperry & Hamilton Navigation System.



## NEWS DIGEST

### Domestic

**B-42 Break.** Northrop Aircraft's best-powered intercontinental bomber, has been moved to USAF's long-range test station at Cape Canaveral, Fla., according to press reports.

**Boeing 707** jet turbo-propeller plane, damaged by a landing accident Aug. 5, will resume its flight test program Sept. 20 at Seattle. Canadian officials say the accident was caused by failure of its hydraulic line, cutting off flow to the 707's main gear.

**DO-16** Seven Seas, enlarged version of Douglas Aircraft Co.'s Turbo Compressor-powered transport (AVIATION WEEK July 26, p. 17), went into production last week at the builder's Santa Monica, Calif., plant.

**Roller tests** are being taken by 600 units maintenance workers and stockholders of American Airlines to protest benefit of ground crew members after the 15-day outbreak of AA pilots (AVIATION WEEK Aug. 30, p. 13).

**Civil Aeronautics Board** has decided to go ahead with its investigation of Eastern Air Lines' alleged control of Colorado, will let CAI intervene in the probe.

**Min. Charles Roberts** will resign Sept. 15 as a vice president of American Airlines to accept *American Commerce Secretary* Lottar Tector.

**Rockwell-powered missile**, built by Rockwell Research Laboratories, Cleveland, is being USAF option unit at high altitudes while flying at supersonic speeds. Rockwell's Cleveland missile enters the test at a production speed and altitude on a flight levelled from a modified B-57. Both test and missile are equipped with recovery parachutes.

**Boeing Airplane Co.** is expanding its airplane assembly plant at Seattle by approximately 17,000 sq. ft., being the total area available for test and development work to 44,000 sq. ft.

**Thompson Products** has set up a new Turbine Drive Division in Cleveland to produce control mechanisms for Boeing B-52s, plane to have more than 100 engines and technical personnel for the operators.

**United Air Lines** plans to buy 240 Montreal Sebel units for certification in its own fleet. The airlines does not sign a bill in the transport market.



### Rolls-Royce Soar Turboprops Go Afloat

Glider Marine, used by Rolls-Royce for turboprop development, is fitted with the engine company's new lightweight four-cylinder turboprop at the shipyard for flight testing. The engine was scheduled to fly in its own powerplant at the Fairbairn display last week, with its thrust jets turned off. The Soar develops 1,518 hp thrust. Weight is 287 lb. Diameter is 18.75 in., length is 63.75 in.

when ground rule operators went to contact an individual flight (AVIATION WEEK July 3, p. 72).

New crash barrier for runway overruns will be developed by All American Engineering Co., Wilmington, Del., under a \$465,000 USAF contract.

**Robert Minshall**, 56, one of the principal designers of the B-17, became vice president of Boeing Airplane Co. and former board chairman of Borg-Warner Corp.'s Press Products Division, said Sept. 7 in Cleveland.

**Harvey H. Dwight**, 40, president of Aircraft Engine & Parts Co., based in Chicago, was named president and director of the Wings Club of New York, said Sept. 7 in Greenwich, Conn.

**Art. Arthur. Egan**, 60, one of the first U. S. military pilots and public relations director for the Army Air Forces at the start of World War II, died Sept. 7 in Cleveland, Fla.

**Best Aircraft**, early manufacturer and engine test pilot and aviation consultant, died Sept. 1 at Denver. He was 58.

### Financial

**Ryan Aeronautical Co.**, San Diego, reports a net income of \$1,618,125 for the first nine months of fiscal 1954, approximately 20% higher than the \$1,362,946 for the same period last

year. But gross income dropped 10% to \$36,199,076. Bookings July 31 about \$50 million.

**National Airlines** had a net profit of \$4,465,747 for fiscal 1953, a new company high and a 31% increase over last year. The net included capital gain of \$3,073,564 for equipment sales. Operating revenues climbed to \$48,799,557, but operating expenses increased to \$35,371,778.

**Chrysler Vought Aircraft**, Inc., Dallas, has declared a 4% dividend on common stock, the first since the company requested from United Aircraft Corp. The dividend is payable Sept. 27 to stockholders of record Sept. 10.

### International

**KLM Royal Dutch Airlines** Super Constellation crashed at Lofdalen, Norway, on Aug. 26. The 58 people aboard the New York-based transport. It was KLM's second crash in 11 days (AVIATION WEEK Aug. 30, p. 7).

**Suzanne's 1402** Galtair, delivering French interceptors powered by a 6,177-hp thrust Sorensen Alfa turboprop, has exceeded Mark I in level flight without a boost from rockets or an afterburner.

**Henry F. Folland**, 67, pioneer British aeronautical designer and former managing director of the Folland Aircraft Co., died Sept. 6 at Northham, England.







FAMILY REUNITED BY PAA's installment plan is one facet of air credit. TWA (right) explains "pay later" to new passengers.

## Airlines Predict Boom From Travel Credit

- Entire industry is expected to set up installment plans in near future, following the lead of Pan American.
- Salesmen believe the public is conditioned to "pay later" buying, needs to be told what air travel has to offer.

By Katherine Jackson

The U. S. scheduled airline industry is beset by early mass adoption of "fly now and pay later" plans, pushed by traffic experts who predict that nothing short of a boom will result. At Traffic Conferences, the airlines' traffic representatives, is expected to coordinate on working out a financing plan for the industry as a whole at its coming meeting, the first week in November.

But even if this fails, a major part of the industry has moved forward with "pay later" programs since Pan American World Airways unveiled the full selling in mid-May. They will pay when a selling point that never has been capitalized on by retailers or shipping lines.

• **Basic Results:** In moving into installment selling, airlines are following the credit-conscious pattern of most other U. S. businesses. From high prices and a restricted market, the industry wanted to tap the mass market with low fare, credit service.

Now, airline traffic men believe the

time is ripe to reach further into that market with credit sales. They have the backing of airlines, automobile, home construction and recreation industries on which to base their loans.

The industry's big job is education of the public. The U. S. already is largely a credit economy. Automobile sales total about \$60 billion a year. The public is conditioned psychologically to credit and pay-when-you-go buying.

Airline salesmen see their task, as one of familiarizing the public with what they have to offer and directing the public to think in terms of buying on credit, not cash, as well as automobiles and television sets, the small "loan" payments.

• **\$1-Million Promotion:** Put airline "pay later" plans into contact with outstanding success. But the publicity is believed by traffic men to be so false to back them with sales presentation.

PAA and Trans World Airlines have taken the lead in handling big advertising campaigns. Pan American's new advertising budget for the fourth

quarter, amounting to about \$1 million, will be devoted to "pay later" attention.

The two sales representatives PAA has featured previously—the situation of credit loans and low cash fares—will be identical. TWA will match emphasis from much service to "pay later."

• **New Travel-Discounting:** on the airline industry's new trend.

• **Pan American's "pay later"** sales during the first three months of its operation, mid-May to mid-August, were said to total about \$1.5 million out of total passenger ticket sales estimated at \$50 million. PAA officials expect a steady increase in business and a big opening in "pay later" sales will increase when the results of presentation are reflected in vacation sales.

Prices on "pay later" tickets have ranged from \$51 to \$4,000 for a business man who preferred not to make one big \$4,000 bet but to make one.

PAA's first "pay later" ticket was sold to Einarsson, a Swedish immigrant. Census enrollment was, during his term in the U. S. used \$800—the ticket \$506 he needed to leave his son's family from Germany. PAA's new plan made it possible for him to do this by the son's early period under the quota system report.

• **Trans World reports:** \$150,000 in sales during the first 30 days of operation of its "pay later" plan. The airline

line had a \$50,000 backlog of waiting business when it went into effect Aug. 3.

TWA chose its plan has an advantage over the PAA plan. Applicants can be processed quickly—a few hours, if necessary—since this is done by local office personnel.

Pan American applicants are processed by its financial agent, Beneficial Management Corp., within a maximum of one week and with provision for one day processing, if necessary. PAA officials say the speed is sufficient, since other arrangements for foreign travel—visa applications, etc.—require similar time.

TWA's pay approach of "pay later" applicants are selling 75% to 85%. PAA estimates the sale is 50%.

- **Other U. S. international domestic airlines** appear ready to follow in PAA and TWA's footsteps. Northwest Orient Airlines is "ready to go forward" and now has a complete "pay later" plan under consideration. Delta Airlines is "studying the situation extensively."
- **Flights** appear more quick to act after PAA's example.

Scandinavian Airlines System was the second carrier to launch an all-out "pay later" program and now it was playing approximately 100 million in every major U. S. city.

Swedish Oceanic Airlines Corp. and Sabena Belgian Airlines will offer "pay later" plans to the public in the near future.

• **Air France** is "still debating" but the company's financial agent appears to be that even persons who have no money payment will fail, if not, can obtain bank loans.

• **American Airlines** is being behind TWA in putting "pay later" into effect domestically. American's approach is to make financial arrangements with local banks, and it is reported that it will take about a year before this is accomplished at all cities the carrier serves.

So far, American is offering "pay later" tickets in seven cities—New York, Newark, Chicago, Detroit, Los Angeles, San Francisco, Washington, D. C. American has set a maximum of \$150 on "pay later" tickets but remains tentatively together may be grouped on one ticket to reach the maximum.

TWA, however, is giving low-cost "pay later" tickets, as well as "cash out" tickets. Chicago-New York round-trip for \$7.50 down and \$1.00 a month, for example.

• **Eastern and Capital Airlines** have had "pay later" plans for the past few years, but they have not been pushed.

EAL, intended to continue to high-level aircraft service and "perfecting" proposals and keep the "offer now-pay later" suggestion subsidiary.

Capital is now ready to extend its

It's Easy To Be An Adventurer!

## Fly 545 to EUROPE and PAY LATER!

**Fly Abroad now...pay later!**

See how easy it is to fly abroad now...pay later!

**PAN AMERICAN**

**PAA started "pay later" plan, has pushed it with vigorous advertising campaign.**

"pay later" program—now offered on the Pittsburgh-Berlin route—and put down tickets at other Pan Am cities. CAT expects 25% of its Pittsburgh-Berlin business has been "pay later."

- **United Air Lines**, turning credit to the industry trend, shows no enthusiasm for "pay later" and is taking a "wait and see" attitude. The company's thinking now seems to be that travelers are often personal loans from agents, if they want to buy airline tickets as an individual loan.
- **North American Airlines**, biggest of the scheduled carriers, has started "pay later" sales on the West Coast airports, in addition to the main East in the near future.
- **How It Begins:** The snowballing airline movement to "pay later" was started when PAA's vice president, E. J. and sales, W. H. Lapham, "told" the idea to the airline's management. During his 25-year traffic career, Lapham has served at the main office of the PAA in its international service in international air transportation in 1948. His observations:

PAA followed Pan American. Other airlines now are meeting promotion program.

"An transportation long has needed an installment plan to enable it to compete with other similarly priced commodities or the consumer market." The hope is that customers now will buy vacations conveniently with TV sets and automobiles, instead of buying the TV set and the automobile "on time" and putting off the vacation until the third year has been saved.

• The plan stems from recognition that American economy to a large degree is based on credit. Without credit, there would be little hope of maintaining the standard of living.

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## SBAC Coverage

A complete report on the second Session of British Aircraft Constructors' 1954 flying display at Farnborough held south will be presented in the next issue of Aviation Week. Robert H. Blevins, circulation editor at Aviation Week, would British Aircraft Constructors' London correspondent, is over the British aircraft show.

## Low-Cost Titanium

Titanium for aircraft turbine engines is expected to be available at lower prices than the present \$4.50 to \$4.75 per pound if a new electrolytic process, developed by General's Shovelworks Water & Power Co., successfully can produce the strategic metal.

The pilot plant located at Shovelworks Falls, Conn., scheduled to begin tests next month.





all the ground for interception of possible enemy bombers.

- Early warning and interception equipment is a fully automatic Lockheed EC-121 radar and plane, the 79th FS and 3-50D. The fighters also detect and intercept intruders close to 18,000 ft.

- The Army helicopter demonstration included the Pavee II-21C. Work Horse transport and the helicopter, and Sikorsky XH-39 helicopter, new holder of the world speed record (Aviation Week Sept. 6, p. 16).

- An F-4H was launched in a mid-air from the belly of a C-130 B-35 bomber.

- A Boeing KC-77 Stratotanker demonstrated aerial refueling techniques with a B-77 Stratjet.

- General P-002 supersonic interceptors made their debut.

## Static Exhibits

Dayton-Exhibits by the aircraft in display at the National Air Show, with 55 aircraft represented, exceeded last year's show by 50%.

The industrial exhibit covered approximately 60,000 sq ft, or three times as much as the last show. The exhibit was divided into five main areas: the new aircraft, the new aircraft, the new aircraft, the new aircraft, the new aircraft.

Early major engine and engine components were represented in the "React to the World" of U.S. as strength.

- Classified Projects—Lockheed Aircraft Corp.'s display included a number of new projects, including "Climax." These included the F-104, a nuclear aircraft project and a nuclear and jet project.

However, several of the projects were approved by military industry officials, who said configurations of the covered models were not accurate.

Among the items of new equipment featured in other displays:

- Ives, Inc.'s blind flight instrument, the "Nite," which features a simplified, graphic representation of the plane's position in three non-aid, pitch and yaw.

- General Electric Co.'s ramjet-powered turbofan engine, currently used in the Boeing B-70.

- Boeing's new aircraft, the new aircraft, the new aircraft, the new aircraft, the new aircraft.

- Hamilton Standard's new 150-Turbo-Hydrostatic pump, used in Lockheed's helicopter K-12 Super Constellation (see p. 18).

- Solar Aircraft Co.'s new ground power unit for starting jet aircraft. The unit

is powered by a small gas turbine engine producing 50 hp.

- Engineering & Research Corp.'s FV-5 light simulator, produced for the Navy, is the first simulator of its type to be built into a trailer for movement from one base to another, Kees closed.

- Hughes Aircraft Co.'s 27th in Mighty Mouse engine, made, showing the latest line of the engine.

- Military Aircraft—Included in the military display were:

- Bell X-4A, which recently set an official world's altitude record of 98,000 ft. (Aviation Week Aug. 30, p. 18);

- and holds the world's speed mark of 1,650 mph. (Aviation Week Dec. 21, 1974, p. 7).

- Fairchild's C-121A, an aircraft transport.

- North American's F-100 Super Sabre.

- Douglas X-3 experimental model.

- Northrop X-4 experimental model.

- Army's helicopter, Navy's helicopter, Republic's helicopter, Air Force's helicopter.

The Boeing B-52 bomber was not included in the general exhibit at the Dayton show. Following its flight from Seattle to Dayton on the first day of the show, the plane was based at Wright-Patterson AFB and made its flight from there on the following two days.

Many exhibit was limited this year to a few aircraft and parts and diagrams showing Marine support and defense techniques. There was no Marine or defense exhibit because of heavy opposition and criticism.

## Seaboard Gets First Cargo Super Constellation

Seaboard & Western Airlines, making high in the value of a \$7-million Airco contract for new Airco cargo and passenger flights over the coast in monthly (Aviation Week Sept. 6, p. 7), is taking delivery on the first line of Lockheed Aircraft Corp.'s commercial version of the aircraft Super Constellation.

Each of the four aircraft will be used to carry 100 passengers in the new Super Constellation for the following features:

- Crossing speed of 315 mph.

- Main cargo compartment that is 15-ft long.

- Capacity for 170-180 passengers when required.

- Extended engine life, with 2,000 hours of engine life and up to 10,000 hours of engine life and up to 10,000 hours of engine life.

- Full-day air conditioning for protection of perishable items.

As delivery began, Seaboard & Western, Seaboard's president said, "We have been a truly long-range, heavy lift

aircraft. The new construction of pre-war, daytime and night will permit us to make open the door to the vast potential of long-range air travel."

Meanwhile, Civil Aeronautics Board received another request to suspend the true Airco cargo over, the new line Overseas National Airways (ONA) wants the Board to take another look at Seaboard's operation on the grounds that the board's action has been violating the Civil Aeronautics Act by operating a regular frequent service in the Atlantic area.

ONA also was involved at Seaboard's recent open letter to the President, printed in several newspapers. The brief holds that the letter's purpose is to "convince the Board and the President of the United States that Seaboard & Western is a bona fide Airco cargo carrier."

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## NWA-EAL Through Service Proposed

Interchange agreement between Northwest Coast Airlines and Eastern Air Lines for through service from Minneapolis-St. Paul to Miami has been recommended by Civil Aeronautics Board to examiner Walter Brown.

The proposed service would offer two fast-class roundtrips a day between Minneapolis-St. Paul and Miami and one service, Minneapolis, Tampa and Atlanta. Roundtrip service flights would run daily between the Twin Cities and Miami and Tampa.

Advantages: The interchange offers advantages to both Eastern and Northwest since it allows both to make use of idle equipment during all seasons; the constant use of EAL's heavy monthly run from December to April, while NWA's heaviest flow runs to October.

Through the use of Northwest's DC-6Bs and 177s in the winter and Eastern's Super Constellation in the summer months, both can improve overall utilization of equipment, Brown said.

New Market—Estimates of the profitable market between points involved can be 75,000 to 100,000 passengers a year. The airline is expected to fly 1,000 to 1,200 flights a year, with 1,000 to 1,200 flights a year, with 1,000 to 1,200 flights a year.

The interchange is expected to yield approximately \$50,000 for Northwest and \$100,000 for EAL in extra passenger revenue in the year ending Sept. 30, 1955.

Chief of Airlines said that the interchange proposal is approved because it duplicates CAA-Norfolk service from Minneapolis-St. Paul to Miami via Western Airlines. National expressed the fact that the agreement would give Eastern control over north-west service in the East.

Brown noted that the advantage to the public outweighed other considerations and advised the Board to agree.



**Sikorsky XH-39** rotor, viewed by Sikorsky public, not developed from S-51, features retractable landing gear, four-blade main rotor. It cruises at 115 mph. New rotor assembly set record at 116.01 mph, over a 13-in. course at Wurtsmith Field, Ohio.

## New Copters

- Bell shows 47G-1 utility craft at Wright-Patterson.

- Sikorsky flies turboprop XH-39 at Dayton show.

Dayton—A new low-price utility helicopter, designated the 47G-1, was demonstrated last week at Wright-Patterson AFB by representatives of Bell Aircraft Corp.

The machine was not put on display at the National Air Show, but spectators did see the first public performance of the new Sikorsky XH-39 (S-59), turbine-powered aircraft that usually set a new helicopter speed record of 116 mph. (Aviation Week Sept. 6, p. 16). It was flown during the Army's new demonstration by the record-holding pilot, Warrant Officer Billy Whelan.

- Lower Maintenance—The 47G-1 is composed of all the dynamic components of the smaller Model 47, but the 380 hp. Franklin engine will be replaced by a Lycoming G455 diesel from 280 to 235 hp. The new engine is the same one used in the Aero Commander and Twin Beech.

- Bell representatives say that the engine will result in a helicopter that can have in ground effect with less than 75% of normal rated power. It also is expected to reduce maintenance costs.

- Other features of the 47G-1: The Lycoming engine will be certified for use with up to 100 feet of rotary automobile gasoline to 107 octane.

- The engine will improve high-altitude and hot weather performance.

- The helicopter will operate at 3,500 ft. gross load, including two persons, 40 lb. of baggage and fuel for a range



**Bell 47G-1** four-blade (displacement) has several features: H15 rotor, "new" powerplant engine. At top is Bell's standard 47G demonstrator, "new" Model 47.

of 280 mi. The service ceiling will be in excess of 10,000 ft. and the landing ceiling more than 5,000 ft. in ground effect.

- Space behind the pilot, occupied by three passengers, can be converted for housing two 500-cc. fuel tanks and three 100-cc. fuel tanks.

- Passenger doors are optional for the basic version and a forward door is standard for the medical transport.

- Cruising speed is 100 mph, Bell says.

- The four-passenger Bell helicopter was first tested on a two-week test tour to more than a dozen Army and Air Force installations.

- For maintenance, pilot and armament director of contract for Bell, will use as additional to the military reaction to the 47G-1, its company is preparing to start the commercial corporate market for a helicopter of this type.

- Although 47G-1 initially, the aircraft is a slightly altered version of the standard Model 47, with a larger cockpit bubble. Overall length is a little more than 32 ft. The single rotor stands 9 ft. 1 in. above the ground.

- The Sikorsky helicopter is an experimental project sponsored by the Army to test the practicability of the turbine engine.

and Model 47, with a larger cockpit bubble. Overall length is a little more than 32 ft. The single rotor stands 9 ft. 1 in. above the ground. Instrument panel is offset to the left of the pilot, giving him unobstructed vision straight ahead.

The new Sikorsky speed-breaking helicopter is powered by a Turboprop XH-39, 11,450-hp gas turbine engine. Water, who has flown it about 18 hours, says tests so far indicate the engine will not see standard for helicopter applications, such as operation in the military.

Cruising speed of the XH-39 is 125 knots (115 mph) with a useful load of 1,360 lb. Sikorsky says. Service ceiling at cruising speed is 9,500 ft. as high.

The Sikorsky helicopter is an experimental project sponsored by the Army to test the practicability of the turbine engine.





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## New Ag-2 Nears First Flight Test

All-metal Translational spray/duster has the crash-safety features of Ag-1, is designed for good performance.

A new agricultural plane, specially designed to combine good fuel and performance characteristics with crash safety, will fly for the first time late this fall at Tarrant Municipal Airport, Calif.

Designed for Translational Ag-2, the craft at first glance strongly resembles the Texas Ag-M Ag-1, designed by Fred Wood.

This resemblance is intentional. Translational purchased the rights of the Ag-1 when the plane tangled with a power line during a demonstration and was completely written off. Because of the Ag-1's design, the pilot walked away (Aerospace Week, Aug. 24, 1971), p. 17). Texas A&M College collected detailed comments from about 600 pilots and operators who had flown the Ag-1 and these have proved valuable to Translational in their new project, as has Fred Wood, who is serving as consultant on the Ag-2.

Construction—The Ag-2 has an all metal airframe, wing structure alloy steel, wherever possible and avoiding compressed carbon, forged fittings and castings.

Simple construction is used through-

out to make the plane easy to maintain and repair. Standard wrenches and tools will remove nearly all components, with specially designed tools to be provided where needed. There is a 17-in.-ft fuel and equipment storage area under the cockpit.

The wing is made up of four side vertical panels with built-in struts. The two inner panels, containing the non-moment plastic spray tanks, bolt to the fuselage at four points. That attachment also gives the outer panels to the inner sections. Wing assemblies and fittings are screw attached.

The wing uses a high-lift NACA 69021 airfoil and built-in slotted flaps, with the outer panel having ailerons. When the flaps are lowered for a dust or spray run, the elevator is trimmed automatically.

Translational purposely has used a great lot of Cowan W-115 burner components to keep the price down and allow ready availability of parts. ET-75 parts used on the Ag-2 include the 416 hp Pratt & Whitney Avcojet engine and accessories, modular powerplant nacelle, cooling and propeller, main landing gear and wheels, tail gear shock strut, instrument landing lights, radar probe and pilot's seat.

Safety Features—Like the Ag-1, the pilot's cockpit in the new plane is placed high to provide maximum visibility while taxing, making low-altitude passes or in the turn.

The Ag-2's structure is designed to absorb crash cushioning progressively, with the cockpit intended to be an "island of safety" that will remain intact after the engine wings and landing gear have taken the brunt of impact. Fuel tanks are in the outer wings.

The cockpit incorporates a canopy structure, over-the-cockpit side door and has no sharp protruding objects. It is sealed to prevent clouds

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see  
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all spray or dust from mixing. Pilot's seat and shoulder harness are capable of withstanding a 40G load. No heavy cargo seats are notified at all the cockpit.

► **Space/Dust Dispenser**—The Ag 1 is built around its ejecting equipment—pumps, gauges, tanks, hoppers, spray hoses and sprayers.

There are separate systems for handling solids and liquids. The dust hopper is in the fuselage ahead of the cockpit, and spray tanks are in the wings. A simple clutch mechanism allows the pilot to activate either system with a single lever.

The 15-in. h. hopper fastener hoppers hold 2,000 lb. of low-density material compared with the Ag 1's 27-in. h. capacity. The Ag 2's liquid capacity is 750 U. S. gal., compared with the Ag 1's 150 gal.

► **Five Prototypes**—Plans are now being fabricated for five Ag 1 prototypes at Tarrant's El Segundo plant.

The company will make the plane available in three ways:

- **Complete**—Bomber plane, approx. cost \$45,000.
- **Fly or ship**—A ET-11 for parts removal. Plans will be for the Ag-2 without the ET-11 parts value, plus labor.
- **Complete machine**, less ET-11 parts, for shipment to buyer. Kit includes no weekly construction.

## European Airlines Emphasize Comfort

By James Westergaard

Comfortable air and ground travel with a minimum of red tape are being given major consideration by European airlines and airport authorities.

Conservation begins with bus service right to the door of the airplane at London. It carries through to the low-cost buses and restaurants where passengers who have passed government controls must check planes at the Zurich-Kloten Airport in Switzerland.

► **Road Taps**—Mikeland—This writer did not have to open a bag at any airport during a three-week tour of Britain and the Continent, including low-cost airlines at various international terminals have been developed to aid the passenger.

Immigration officers check passports, currency control officers ask about the traveler's funds, show customs officers inspect baggage. Every airport, except those in Switzerland have passport and currency controls. Nowhere did it take more than five minutes to clear the four controls.

► **Laterally Tempo**—The luxury European tempo is noticeable in the abundance of restaurant and bar facilities at airports.

The bus terminal is the center of

## Worth Defending



### FREEDOM OF ENTERPRISE

In a free society a man may work for himself or work for others... own his own small shop... or build a factory.

In a totalitarian state he is a mere cog... a member on a card, slated into a master plan of iron control and regimentation.

Freedom of enterprise should be everyone's right... the right to choose the work one best likes to do... to benefit freely from the results of one's own endeavors... to seek toward the state. Most assuredly,

freedom of enterprise is worth defending.



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One of us is indebted to the author of this article.

A subsidiary of GENERAL FINANCE CORPORATION, New York, N.Y. —Whelan, Inc.



0900 Stepping up on their work stands, line crew removes tailfin engine cowling.



0906 Quick-disconnect of J47 electrical, fuel, and oil lines are completed.



0911 Crane cor lifts engine forward as replacement unit rolls into emplacement.



0914 Engine is swung away from wing as new J47 is pulled into position.



0919 New engine hoisted to white cover labels J47 fuel, oil and electrical lines.



0924 Abrasive "bullet nose" and cowling are dropped on jet before running engine up.



## Simple design of G-E J47 helps S.A.C. crew make 25 MINUTE ENGINE CHANGE!

MacDill AFB photos show how G-E engines, Boeing wing pods, and S.A.C. ground crews have cut bomber maintenance time and costs

A Strategic Air Command B-47 ground crew recently changed a G-E J47 jet engine in 25 minutes. We mention this for two reasons: twenty-five minutes is about one-eighth the time it used to take to change a WW II bomber engine. And the 15-minute change is typical of the steps in which the J47's clean design and durability help S.A.C. save time and money.

### Good design: Easy maintenance

The J47's relatively simple construction makes the engine very easy to maintain, compared to other types of powerplants. For example, at MacDill AFB, S.A.C. crews get up to 600 hours from J47's before major repair. This is nearly twice the major repair

average of S.A.C. piston engines. And moreover the cost of J47 maintenance—and the human effort involved—is less.

### Good design: Long operating life

Proof of the J47's durability lies in the fact that B-47's attached to the 508th Bombardment Wing have gone more than 600 hours without a single engine change. That's the equivalent of 15 nonstop globe encircling flights. A Tampa newspaper has quoted a B-47 ground crew as calling their J47's, "The engines that never quit."

Facts like these illustrate the J47's contribution to the Strategic Air Command. See how the J47's contribution to the Strategic Air Command. See how the J47's contribution to the Strategic Air Command. See how the J47's contribution to the Strategic Air Command.

*Progress Is Our Most Important Product*

**GENERAL  ELECTRIC**

EASE OF J47 MAINTENANCE is illustrated by this photo of a S.A.C. B-47 detached wing pod. J47 installation can be removed quickly for minor repair and overhaul.

LONG J47 OPERATING TIME BETWEEN OVERHAULS is verified by B-47 No. 10216 of S.A.C. 508th Bombardment Wing. Aircraft flew more than 600 hours without a single engine change.



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Amsterdam, where passengers assemble for transportation to Schiphol Airport, is outfitted with modern lounge chairs and small tables where coffee, tea or other refreshments can be had. At Nieuw, the airport has an outdoor patio with flower gardens, chairs and small tables for passengers.

At London, passengers are all but craned out and off their planes. A bus takes the passenger from the waiting room directly to the airplane standing some distance away on the apron. Arriving, the passenger takes a bus to the waiting room.

The buses are of unusual design, half the vehicle is the usual height, and the rear half is elevated in double-decker fashion. Luggage is stored under this elevated portion. Routes are of Flingha British European Airways were similar buses by the airport from the new air terminal at Waterloo Station, located on the site of the 1951 Festival of Britain exhibition.

► **Lounges.** Buildings—Most lounges and smokers of all airport buildings clustered on the four-acre site at Gatwick and Zurich. Public halls, restaurants and passenger waiting rooms take up a small portion of the terminal buildings at both these fields. The rooms have all-glass walls facing the airport and are two or three stories high. Washington National Airport's waiting rooms is closed in appearance.

After passing through customs, passengers enter in the large glass-walled rooms and eat or drink. The waiting rooms here shops and run a survey for motion traveling with whom. Currency exchange facilities are available in the waiting rooms as well as the public halls. These currency exchanges or banks are standard equipment at all European airports visited.

Airport attendants lead passengers to and from aircraft.

► **Transport Services.** Every European airport served by this route carries at least two standards. Some carry three, and BEA also has a third.

Every passenger is briefed before departure and, next, controls. Passengers on BEA and Air France (passports are instructed on how to do in event of an emergency landing, where life belts are and how to put them on).

This may not contribute to the peace of mind of all passengers, but it does show them how they can help their selves in emergency.

► **Passenger Comforts.** In the air, show address on BEA, Air France, Swissair and KLM Royal Dutch Airlines planes changes their uniforms for white uniforms.

All four BEA use new U.S.-built planes. BEA has the Bristol-De Havilland Ambassador. Elanair (last aircraft) with half the seats being forward and the rest aft. Disposable sets are still

sent for meal service or other use. Seats adjustable tables were found in four other planes, except for KLM's Conquest, whose seats are balanced on the meal service.

BEA's planes also have adjustable down-filled headrests or pillows in that full and short passengers can rest comfortably.

► **Meals and Drinks.** Meals in all planes are good and served appetizingly.

The best meal, in this reporter's opinion, was served on the Swissair flight from Nieuw to Zurich. It was not only the biggest, most varied, but it made the most of substituting Swiss food. Large portions of Swiss cheese, cold and other delicacies were wrapped in plastic containers, sealed in Swiss products prepared especially for the airline.

A large hot meat and vegetable plate and a big portion of hot soup were served on the KLM plane from Zurich to Amsterdam. The meal was served in two courses—first the soup, then the hot plate.

Drinks could be obtained on all planes. Most planes serve mineral water instead of hot drinks, although wine is begun in available in demand.

## Hinshaw Warns India On Rejecting Air Pact

Rep. Carl Hinshaw has warned India that the United States is likely to withdraw its U.S. international air agreements to that country are curtailed.

India has announced its plans to reject the current air transport agreement with the U.S., effective Jan. 17, 1955.

"The government of India must appreciate that the rejection of this air agreement will not find favor as a basis by which to, since India retained her independence, been unwilling to do direct contributions to India's advance and in the many indirect benefits which result from a free exchange of people and ideas between our two democracies," Hinshaw declared.

He observed that from 1951 through June 30, 1955, U.S. and to India will total \$494 million.

Hinshaw expressed concern that "India's proposed restriction of air transportation would set a bad precedent for other nations of the world. It is a step backward and a dangerous one. In fact, war has occurred here centuries to terminate the agreement with the U.S., either countries have demonstrated a similar tendency to restriction."

"This is international relations of the worst sort. And the world should know by now the odds which may result from this kind of behavior."

## FACTS ABOUT



## CURRENT PROGRESS



Plant 1, Farmingdale, N. Y.

Thus, the advent of these plans engaged in present-day development and production, establishes the planned growth of the Fairchild Engine Division... and the progressive spirit of an organization that has progressed in its field for over a quarter of a century.

When these modern, completely equipped plants—working almost an million square feet of floor space—a variety of special-purpose powerplants are being designed and produced for use on land, at sea and in the air. These include the J44 turbojet engine, developed by Fairchild for the Navy and now in volume production for each of our Armed Services, new-type propeller engine systems for underwater vehicles, and auxiliary aircraft engines... all in addition to a greatly expanding component manufacturing program.

Today, to meet these increased responsibilities, the Fairchild Engine Division is growing faster... to serve America better.



Manufacturing skills support production of Fairchild J44 turbojet engines for jet-powered aircraft.



Thrusting equipment on modern Fairchild J44 turbojet engines for jet-powered aircraft.



Advanced gas-turbine engine (J44) with a large propeller, part of the J44 engine, part of the J44 engine, part of the J44 engine.



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VARITY of shape and size is true-forming. At start...



STAINLESS steel blank is held between rounded (1) and (2)...



IN FIVE MINUTES flow turning is done, just a study for knowing (3). Blank and finished rotate at about 400 rpm during turning.



## Flow-Turning Speeds Metal Forming

Jet engine parts are being formed cold by flow turning at Pratt & Whitney Aircraft.

This process for forming metal to the shape of a mandrel by controlled rotation requires simple tooling, gives uniform results, even grain flow, improved tensile strength, small waste, and saves considerable time.

How It Is Done—A cold flat sheet or roughly finished disk facing a ball

against the mandrel by a hydraulic ram. While the part and mandrel rotate, the ram (about 400 gpm) is separately operated, roller marks a large force (about 25,000 lb) against the metal so that it gradually takes the shape of the mandrel.

A variation of metal spinning, flow turning is repeated in rapidly heated after a short basic forming period, allows for greater adherence to closer

tolerances. From a modern production standpoint, spinning is not an ideal, depending upon the skill of the craftsman and the variety of his tools, P&W says. Flow turning overcomes these critical factors.

More Shapes—Already the company has flow turned a number of different types of parts—conical, cylindrical and complex shapes. Some complex parts previously were impossible to press out

## 127 New Departures Join the Navy!



Westinghouse J-40 jet engine with Edlund Mando Automatic Control for the after burner, where 127 New Departure ball bearings substitute extreme precision and efficiency.

Design by Douglas... gone by Westinghouse... precision by New Departure. That's the Navy's F4D SKYRAY jet—first carrier-based plane to hold the world speed record—703.4 mph.

Among other applications in the SKYRAY, there are 127 New Departure precision instrument ball bearings in its Westinghouse Edlund Mando Automatic Control. This control maintains proper engine temperatures, and demands the utmost in bearing accuracy and efficiency. New Departure meets these demands.

Throughout defense and industry, you'll find New Departure making good products even better. Learn how these fine ball bearings can help your design... talk with your New Departure engineer today!

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NEW DEPARTURE BALL BEARINGS...  
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## How semi-tempered, single curved Flexseal Duplate is used in the North American F-100 Super Sabre



### A report from THE PITTSBURGH AIRCRAFT GLAZING FILE



The North American F-100 Super Sabre is America's first supersonic operational jet fighter. This sleek aircraft with its swept back wings has a service ceiling of above 50,000 feet and a combat radius of more than 500 miles.

Metal insert Flexseal Duplate is used in the F-100's side windshield as indicated in the section at left. It consists of two plies of 1/4" thick semi-tempered polished plate glass and a .025" vinyl filer. The overall nominal thickness measures .349".

The 520 in. nominal radius measures 18 1/2" x 4 1/2". They have a depth of 3/16" with a radius of bend of approximately 54".

The special aircraft glasses made by Pittsburgh Plate Glass Company are the result of many years of glass research and specialized experience in meeting the glazing requirements of America's leading aircraft manufacturers.

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**ROUGH DISK** blank against anvil with 21,000 lb. force during forming.

with a conventional die because the metal fractured.

One example cited by P&WA is a "test compressor bearing support." This geometry indicates a multiple compressive insulation (though not identified by the company, it may refer to the dual-compressor B7). Starting with a 55-lb. forging, P&WA used its full 33 different machining operations and more than 1000 cuts to finish out a finished part weighing 14 lb. This meant 16 lb. of scrap, various setups and tool wear—expensive things.

For fine turning, only a 27-lb. rough forged disk is required. Rough machining takes little more than an hour to turn off excess material, and about five minutes to raise out the 34-lb. part.

Flow turned parts have greater tensile strength, and even after stress-relieving processes, they are considerably stronger than the machined counterpart, P&WA says. The flow turns it in the same direction as longitudinal metal.

Idea for the flow turning machine was conceived by Arthur A. Moss,



**FLOW TURNING** part is formed from disk disk, still very rough 50-lb. forging, lots of machining and setup.

P&WA's chief of advanced tool engineering. The machine was built by Lodge & Shipley to P&WA specifications. Three of the units are at P&WA's East Hartford, Conn., plant.

## FLETCHER



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AVIATION WEEK, September 13, 1954



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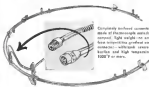


It's tough to take the temperature of a jet's tailpipe. Severe vibrations and extreme changes in temperature are work-measuring equipment. Yet, the thermometer is vital to men who build the engines and fly the planes.

The harness used for the job must be rugged enough to survive brutal operating conditions (even ones brutal now that engine thrust and temperatures are being increased.)

T-4 has several solutions to the problem, and the right, holder-type harness shown below is one of them. Extension wire is protected from the heat, corrosion, and abrasion by one-piece, stainless-jacket which are lined with ceramic insulations. Positive and negative conductors are jacketed separately for convenience and ease of installation. Harness must be equipped with open and air stagnation thermocouples.

Briefly, it's a well-made harness that can take lots of punishment and high temperatures.



Completely enclosed connector is made of thermocouple material. Light weight one-piece stainless-jacket protects conductors—without stress of flexure and high temperature. 1000 V or more.

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SADDLE RIVER TOWNSHIP, ROCKHILL PARK POST OFFICE, NEW JERSEY  
IN CANADA—THERMO ELECTRIC (Canada) Ltd., BRAMPTON, ONTARIO



## 'Home-Made' Press For Fuel Tanks

Labor and material costs have been reduced up to 94% using this 15-ton hydraulic press built from salvaged or scrap aircraft parts, its designer, Pasadena Aviation Corp., Los Angeles, reports.

Pressure first used the press to punch and punch a difficult-to-punch pattern of holes consistently with a large screw hole in aluminum fuel tank nose cone. Devised by hand at scratch, the operation would take 10-15 min. and required burning, and require 5000 lb. of air and motor drives, the firm states. In new press this task is only 10 sec. using a power and block die casting 5000.

The results are easy to maintain aircraft landing gear cylinder for a hydraulic unit, with leading wires being plasticized to a low viscosity control valve, incorporated from bent switches. The accumulator-type hydraulic system, designed and built by Pasadena, reduces power requirements from 9 hp. to 34 hp.

A five-volt 1/2 g.p.m. pump, operated at 1000 rpm, supplies the hydraulic circuit at operating efficiency.

## PRODUCTION BRIEFING

► Douglas Aircraft Co. is making up a T-17 trainers fleet, and aircraft, facilities to build the new A-10 Skyhawk. Light-weight Navy bomber. Plant is to be completed by November.

► Canada, Ltd., Montreal, is constructing a building to house its film, and photo template reproduction area, and pattern shop under roof. Total floor area will be 130,000 sq. ft. All templates for Canada's maritime reconnaissance version of the Bristol Britannia will be made in the new facility.

► Cardo-Wright Corp., Wood Ridge, N. J., has negotiated license and engineering agreements with four German

# Phil-trol Data for Relay Users

## Relay Requirements Fulfilled More Easily By Greater Diversity of Phil-trol Relays

New Features, Wide Choice of All Components Create New Flexibility of Phil-trol "Standard" Units

A specially developed relay manufacturing technique, exclusive with Phillips, is the application of aluminum interlayer blocks as provide standard features in a light-weight, multi-coil relay.

Other new features developed by Phillips mean that relays for special use can be completely customized, which formerly have required complete engineering from scratch, at many times new cost per pound, much longer and in larger or smaller in past even standard models.

Only in a wide movement of wiring, types and characteristics are now almost completely standardized by Phillips during relay assembly. Better features, such as wiring, signals and timing, are now easily fulfilled, at the same time, as the importance of operating voltage, timing sequence and release contacts.

The contact position is constant of springs is accomplished now as easily. And variations of contact forms and of spring constants are now standard practice in Phil-trol.

### Power Relay Series Complete

Representations of strength and mobile components for signal or industrial control and vibration have caused significant advancement in the design and construction of Phil-trol relays.

The Type 27QA, also using many Phil-trol standards in this program, is manufactured in this field to be less than conventional in weight by having a series of changes in the coil circuit to reduce vibration and shock, as achieved by standard coil winding conventional weight in coil relay.

A comprehensive Phil-trol manufacturing process is incorporated which is consistent and economical, without adequate what stress, vibration or wear does a "standard" Phil-trol relay which will properly fulfill relay requirements with substantial savings in cost.



Phil-trol  
Type 27QA

Relay

This Type 27 Relay is available in 1, 2, 3, 4, or 5 pole models, with single or double throw. Operating voltage up to 150 VDC, maximum up to 15,000 volts. Maximum operating current is 100 amps. Available in dual (over), or substantially sealed (as shown above as right).



New Home Plant for Phillips

This new, modern, daylight plant, in Tulsa, Illinois, has enabled Phillips to re-engineer all its relays and assembly methods—many improvements for relay manufacturing.



### Most All Phil-trol Relays are now Available Hermetically Sealed

Advancements known only in Phillips are now being used to deliver hermetically sealed relays superior to any other similar products in the field.

In general, Phil-trol Relays are mounted on the proper base material, with hermetic seals, with ENTRA-100 soldering and in the glass bodies. Multilayer wrapping covers all areas, then they are sealed. Each enclosure now is subjected to a few minutes of pressure, ensuring all areas of pressure in gas, then sealed with chemical sealant. They are then pumped full of dry nitrogen. At least of finishing parts were cleaned with hermetic process and "dressed" each unit. The 27QA Phil-trol Sealed Relay shown here accommodates the Type 27QA Relay.



### Twin Contacts Give Phil-trol Type 3 Relays Exceptional Reliability

Desired for reliable and long-term action in applications where many rapid opening and closing of contacts is required involved in the design of the Phil-trol Type 3 Relay.

These relay feature high sensitivity to low impedance response, excellent adaptability for manual operation, with low inductance and stable timing and opening. Thus, to ensure that these characteristics will meet the Type 3 Relay are given "V" springs, providing them with twin contacts, opening in either closed position. Long life—many bearings under the maximum position of operation.



Let  
**Phil-trol Progress**  
Help Solve Your  
Relay Problems

**Phillips Control Corporation**  
A FINE CORPORATION

PHIL-TROL (CIRCLE) 204P - July 1964  
Name of client:  Name of person responsible:  Area:   
Business Phone and fax:  General Location:

Phil-trol is currently located in Phil-trol Type 27QA ☐  
Phil-trol Type 27QA Relays ☐ Phil-trol Hermetically Sealed Relays ☐

Name:   
Company:   
Address:   
City:  State:

100,000  
horsepower

50,000  
feet high

2,000  
miles an hour

from a  
1,500 lb. engine

Ramjets by  
**marquardt** AIRCRAFT CO.

Tan Buys, California

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and Swiss firms already C.W. has rights to produce apparatus in electronic and ultrasonic fields, including devices for measuring, comparing and control. The firm is considering establishing a division to make the new equipment. A special showing of the devices is planned for next month in November.

► **Machine tool leasing plans** for periods up to nine years are being offered by manufacturers Jones & Lamson Machine Co., Springfield, Vt., covering turret, lathe, mill, drill and three grinding, optical inspection and threading dies and other specially designed items. Four different lease plans are available, requiring 10% deposit, with rental payments being fully deductible for income tax purposes. Taxes can include option to buy. J&L experts will survey customer's plant and work out accommodation plans, if requested.

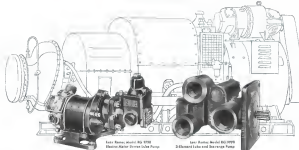
► **E. F. Goodrich Co.**, Akron, Ohio, has purchased assets and business of Sprague Rubber Products Co., with plants in Shelton and Derby, Conn., Pittsfield, Mass., and a Canadian subsidiary in Windsor, Quebec. In addition to its line of rubber products, the firm will get engine pressure switches. Goodrich will operate its operations in a division with SRF president Frederick Doherty and vice president William Wilkins Voth retaining their positions.

► **Confidential Can Co.** has been awarded a new contract to build Green's S-11 cryolite and a new order for order tracking equipment for the Army. Firm reports total aircraft and defense sales exceeding \$10 million for the first half of 1974, bringing its backlog to \$45 million.

► **General Electric Co.'s** Chemical Materials Department, Pittsburgh, Pa., has embarked on experimental shell-packing facility with complete facilities for cutting, sealing and pouring casting. The facility is equipped to make test shells and gear castings from customer's patterns on GEC equipment.

► **Aero Design & Engineering Co.**, Oklahoma City, is creating a research and development engineering division to be located on Air Weathermen Field near the University of Oklahoma School of Aeronautical Engineering. The new division will handle design studies, development and flight tests to improve the firm's products.

► **Trucon Aircraft Corp.**, Greenville, Tex., is converting a Cessna 340 to executive use of the president of South Arabia. Included is installation of autopilot and deflector in door and three other 140s recently purchased by South Arabian Airlines.



## How to meet critical "lube" problems of gas turbines

Solex Aircraft Company does it with two Lear-Rome pumps in its "Jeppia" 500 hp gas turbine Auxiliary Power Unit, designed to provide emergency power aboard American Naval ships.

One Lear-Rome electric pump drives oil to the Jeppia's "hot box" compressor and turbine shaft bearings and to its induction gears during starting and speed-up. As the turbine comes up to 20,000 rpm running speed, a second, specially designed Lear-Rome engine-driven pump takes over. With rated capacity of 9 gpm at 30-40 psi, this pump forces a quart of oil per minute through each shaft bearing and through each lubrication point in the gearbox, continuously returning the oil from bearings and gears to the oil reservoir through two scavenging elements.

Lear-Rome has also designed and built lube pumps for Solex's lightweight "Moss" 90 hp gas turbine, which is used to drive APU's in Douglas C-124 and Lockheed Super Constellation transport planes. In addition, Lear-Rome has designed and built pumps for the Boeing NB3 utility gas turbine, and for General Electric J-47-D17, J-47-E21, J-53-P and J-59 jet aircraft powerplants.

These installations are typical of Lear-Rome's ability to design and produce liquid and air pumps and associated products to specific customer needs. Lear-Rome creates your problems in pumps and other special purpose fluid systems. Lear Inc., Lear-Rome Division, Elkhart, Ohio.



**LEAR** LEAR-ROME DIVISION



CONTINUES EOTS is electronic-optical tracking system for locating missiles or planes in flight. Elevations and bearing angles are recorded on 35 mm film for permanent record.

## New Tracker Pinpoints Missiles

One of the newest available tools for locating a missile or airplane in space is the Continues EOTS (Electron Optical Tracking System), a beam-developed photo-theodolite now available through Collins Radio Co. of Cedar Rapids, Iowa.

Several of these units are already in use at the Air Force Research Center of the Air Research and Development Command, Eglin AFB, Fla. They have been utilized for tracking missiles during maneuvers and during launching tests (Aviation Week Aug. 17, 1953, p. 220).

Collins taps the accuracy of the new system in better than 0.1 mil, or one part in two thousand.

**System Setup**—In connection with any optical tracking system, the Continues units are used in quantities of two or more, because the information output is basically a precisely defined sightline. Two or more sightlines are needed to define a point location.

The three stations are synchronized by a master station which transmits pulses through a VHF-PM radio link or through direct wire connections.

Each photo-theodolite records the position of the target on 35 mm film. The film speed can be adjusted for any two

speeds between four and 30 frames per second, depending on the speed and accuracy desired.

Each frame locates the target in terms of bearing and elevation angle with respect to the observer site at the three stations. Size of the target on the film thus is large enough to permit visual check of the attitude.

**Power Aids**—The Continues unit is power-driven, and manually controlled by two trackers who are sighting telescopes to hold on the target. One man operates the elevation handwheel, and the other operates the bearing angle handwheel.

Position of the handwheel driver moves the angular velocity of scope motor, and the change of position of the wheel controls the displacement of the unit.

Remote positioning is rather slow, can be installed in an optical system.

Another accessory is a predetermined flight path function generator. This device feeds the calculated theoretical flight path into the Continues and the slow delay has to make corrections for the deviation of the target from the calculated flight path.

**Link Value**—Collins rates three characteristics of the Continues.

- **Operating limits**, 3,600 to 33,000 miles range (3,250 ft. to 69,900 ft.), varies 10 deg. to plus 105 deg. elev. angle, and unlimited bearing angle.
- **Tracking speeds**, 50 deg./sec. max. max. speed in elevation and bearing movement speed better than 1/200 deg. per sec., maximum acceleration, 100 deg./sec./sec.
- **Precision**, bearing accuracy, 1/500 deg. static accuracy, 1/300 deg., dynamic accuracy, 1/180 deg.

A film reader is being developed by Collins's ES Division, the aim is to take the film recordings and transform them into IBM punch cards to be fed to an IBM automatic typewriter. The history information on the reader may be that there is four data frames on film and recorded per minute with a reading accuracy of 1/1,000 deg.

Although the Continues was developed and is being produced at Collins, final design and servicing are furnished by Collins Tool & Armory Corp. at this month.

## Military Report Lists Rocket Fuel Hazards

A significant report on the health hazards of rocket propellant fuels and oxidizers, has recently been issued as a joint service publication.

Specific hazards and countermeasures are described for these fuels and/or oxidizers: alcohol, hydrazine, methyl alcohol, nitric acid, and peroxide.

The oxidizers considered are nitro-formic acid (NFNA), nitro-formic nitric acid (WFNA), liquid oxygen and 90% hydrogen peroxide.

"Health Hazards from Propellant Fuels and Oxidizers" is published as AFM 71-113, 243, Nov. 1952, AFM 7-1017 and AFM 1606-1.

## Aircraft Firms Win Tax Amortization

Office of Defense Mobilization has approved requests of aircraft firms for accelerated tax amortization on facility expansion at the following firms:

**Boeing Aircraft Corp.**, Wichita, Kan., 14,272.  
**Boeing Aircraft Corp.**, Everett, Wash., 14,272.

**Boeing Aircraft Corp.**, Renton, Wash., 14,272.  
**Boeing Aircraft Corp.**, Everett, Wash., 14,272.

**Boeing Aircraft Corp.**, Everett, Wash., 14,272.  
**Boeing Aircraft Corp.**, Everett, Wash., 14,272.

**Boeing Aircraft Corp.**, Everett, Wash., 14,272.  
**Boeing Aircraft Corp.**, Everett, Wash., 14,272.

## CONGRATULATIONS TO COLONIAL AIRLINES FROM COLLINS RADIO



## COLONIAL'S REMARKABLE all-time air safety record

Without a single accident  
involving fatality or  
serious injury to a  
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24 years of continuous operation  
750,000 landings and take-offs  
2,500,000 passengers carried  
725,000,000 passenger miles flown



Walter C. Drake, President of Colonial Airlines, commending the company's safety record.

In advanced, dependable electronic navigation and communications equipment.

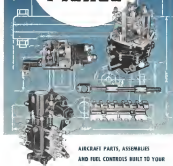
We are proud that Collins has participated in this outstanding safety record by providing Colonial with dependable electronic equipment such as — Collins SIK Navigation Receiver; 185, 330 watt Communications Transmitters with 188K Antenna; Tracking Unit, 440N Power Supply Unit, 350A Omni-bearing Selector; and Collins STJ and STP Antennas.

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In Brief . . .

### 'Accidents Too Accidental'

What should be the progress of the engineer who wants to raise the level of safety in air transportation?

The most kind of air disaster, however, is the operational error, many of which have only a probability, often quite small, of being in certain circumstances, says William H. Stoll of General Aircraft Laboratory, in a paper quoted by Flight Safety Foundation. "Not all will be equally good at it," Stoll says, "but it is an ability which develops with use."

When he supports that a particular operation contains an inherent hazard, he will have to use all his knowledge of the structure and operation of the system to demonstrate the extent to which the hazard exists. He must show that in any situation which may occur in actual operations there is no repeat cycle, odds of hazard. Whether the hazard will actually play a role in accidents is impossible to predict; accidents are too accidental. This is their very first need to make a study of relative hazard. It is the more constant moral.

"When the rest of mankind is just, we have a problem of weighing hazards like against the cost—not in expense of the hazard which demands its being, but in all its other costs, while the constantly demands the taking of risk, in air transportation it is valuable to take any conceivable risk, however small."

"Continuous improvement of the safety record requires us to learn how to detect and eliminate the risks which are built into the operational system in potential hazards or those are events we call accidents," Stoll concludes.

### UK Expands Titanium Production for Planes

Development of a titanium industry to supply metal for aircraft manufacturing is moving forward in Great Britain. The first step was the purchase by W. H. Jones & Sons, Sheffield, of British design and engineering know-how for the working of titanium and titanium alloys from Titanium Metals Corp.

Titanium Metals president, E. R. Fowler, says expansion for a similar size unit underway with a second British company.

Consolidation of Britain's first titanium metal facility now is setting installations. It is the Imperial Chemical Industries plant, which will have a capacity of 1,500 tons a year.

Current U.S. output production is approximately 5,000 tons a year. The goal is 17,500 tons a year by 1957.

# Only GRAPH-MO® gives you all three advantages in one tool steel

**Wearability—Outwears other tool steels 3 to 1**  
**Stability—Is the most stable gage steel ever made**  
**Machinability—Cuts machining time 30%**

YOU can make gages and dies that stay accurate longer and produce them faster by using Graph-Mo® graphitic tool steel. They become only Graph-Mo gives you the combination of wearability, stability and machinability that you want in tool steel.

Free graphite and diamond hard carbides in the structure of Graph-Mo steel give gages and dies extraordinary life. Reports from users show that Graph-Mo outwears other tool steels 3 to 1.

In your plant, Graph-Mo steel will cut production time and reject. Because of its graphite structure, Graph-Mo steel machines 30% faster than other tool steels. This structure also gives excellent resistance to distortion, and has minimum tendency to pick up, swell or gall. Tests on Amelior Wear Machine show Graph-Mo has twice the resistance to galling when compared with ordinary tool steels.



100x

The greater stability of Graph-Mo steel enables you to make gages that stay accurate longer. After 12 years of service, for example, a typical Graph-Mo steel master plug gage showed less than 10 microns of net change from its original dimensions.

You can always tell Graph-Mo steel by its "graphitic look"—the fine, scattered, parallel marks barely visible on the surface of a piece of polished Graph-Mo. This builds "trade name," the result of free graphite is so accurate, can't be duplicated in ordinary steels. The photomicrograph at left shows the free graphite and diamond-hard carbides that give Graph-Mo unusual wear resistance.

Write today for more information on Graph-Mo steel. The Timken Roller Bearing Company, Steel and Tube Div., Canton 6, Ohio. Cable address, "TIMKENCO".

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SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

## Valve Talk

See Wm. B. WHITTAKER CO., Ltd.

by Marvin Miller

Guest Member: Jonathan M. Weiss, Esq.



Ten miles isn't a great distance by ordinary standards. But when the miles are measured vertically, there's a difference.

At 33,000 feet — more than two miles into the atmosphere — you're in another world, a strange realm of nothingness, where you must bear heat, pressure and stay oxygen to remain alive.

Now may you enter this thin, undulating fringe of space without special permission and special training and equipment, for just outside the canopy the temperature is 67 degrees below zero, the air pressure just 1.48 pounds per square inch as compared with a sea level pressure of 14.7 pounds.

The designers' canopy fabric and suspension design were able to create just the right balance of tension and weight, and the resulting canopy was able to hold its shape in the wind. The designers' canopy fabric and suspension design were able to create just the right balance of tension and weight, and the resulting canopy was able to hold its shape in the wind.

There are big possibilities, however, not probabilities and the dangers can be offset to a great degree by training and equipment. That's why the Air Force has set up rigid procedures for both altitude flight.

In order to make such a stop at Northrop's F-4SD Scorpion assembly plant to obtain Air Force permission, which was granted previously (1), that I take a special USNAF physical and successfully pass the screening inquiry of the Federal Bureau of Investigation, was also a step.

As a cardiocardiograph, and (2) that I use an ordinary day-long high-voltage submergence course, in which AFE standard training is provided.

The course itself was a revelation. In lectures, graphs, films, the low oxygen chamber, and the oxygen

person's behavior in the workplace. I found the Air Force leaves nothing undone in its program to ensure the high altitude soldier will do his job.

After making up the word on structure of the atmosphere the physiological factor prevailed, the possible dangers together with their cause and effect, and the operation of equipment.

As I reached the bridge, I was taken on a high to 80,000 feet in the chamber. At 50,000 feet my oxygen was cut off and I reached the break of aerobiosis in 1 minute, 50 seconds. At 30,000 I switched on an AF captain's past performance records.

With others in the class I was jolted through a demonstration of explosive decompression, with a shuddering shock, a blast of air and a swirling cloud of vapor. Later I was hauled into the cockpit, and trainer and instructor were

**All functioned perfectly!** And if you don't think I appreciate this point—fine! still got my work to do.

As this was not a problem to the printer (it



**COPYING:** one copy is 15¢ each

### Unit Tests Effects Of Rain Erosion

**San Diego, Calif.**—An unusual installation at Carvers San Diego plant is testing the effect of rain on aircraft surfaces at high speeds.

Since most of the destroy worm materials is only a few seconds at transonic or supersonic speeds, Canaveral is conducting a non-traditional research program in the only laboratory of its type on the West Coast.

nal loading edges. The equipment is capable of simulating speeds up to 675 mph. A second phase of the program will study the effect of noise in the supersonic range.

Materials being tested include Fiber glass-reinforced plastic laminates, rubber compounds, resins, and metals.

Boat work in the two-megawatt laboratory is no installation work like an aircraft propeller. With natural specimens attached to the leading edges of its blades, it is driven at high speeds while water is pumped down in the 30-ft. high tower to simulate seas.

A minimum low rotational speed of 2,500 rpm and a long blade radius of 41.5 in. are used to eliminate the possibility of the propeller stalls, disturbing the free flow of the water droplets, which



**BEFORE AND AFTER.** Treated plasma (p) shows effect of run at high speed.

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*World's Best*  
**AIRCRAFT...**



**Business Taken to the AGC Above—It Cuts**  
—It's not one perfect all-Cisco Accord. Can  
any, builder of one of the world's most  
popular business air fleets.

Can we also perform surgery for the human brain? They are approximately 10,000 pounds of chemicals per working day in the production of surface waves!

## Where Aluminum Serves Aviation Reynolds Also Serves

There is Raynolds Aluminum in every type airplane that flies today. Raynolds quality control, technical services and follow-through have made this a fact.

From the timing of harvest to actual flight the aircraft industry depends on Reynolds for products meeting its rigid specifications. The products that help the aircraft industry ascend and soar.

Actually, Reynolds helps this growth through filling the market needs and supplementing design and engineering facilities of its customers. Reynolds technical services have made major contributions to the progress of aviation.

Ask to see how Reynolds can serve you. It will cost you nothing to find out. Merely write to Reynolds Metals Company, 2199 South Third Street, Louisville 1, Kentucky.

Source: *U.S. Census Bureau, "Marriage, Divorce, Remarriage in the 1990s,"* December 1992.

REYNOLDS  ALUMINUM

總頁數 50 頁 目錄頁數 1 頁 圖表頁數 0 頁 附件頁數 0 頁

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are spaced from needles located 27 in. above the center of the propeller.

The propeller, made of aluminum alloy, is driven by a hydraulic control which has a maximum speed of 3,800 rpm. To provide safety against propeller failure, the tower is protected by a honey wheel at its nearest point is made up of 6 in. of wood, 4 in. of steel plate, 6 in. of steel, and 1 ft. of reinforced concrete.

One of the problems of the research program was development of a needle which would produce a consistent post-test structural result with droplets having an average diameter of 1.5 mm. To achieve the most uniform rain pattern, two needles are used, one mounted to spin up and the other down.

### Air Remover Stops Sealant Troubles

A new device for removing bubbles from sealant and sealant gels has been developed at Boeing Aerospace Co. The device is said to eliminate troubles that occur occasionally in highaltitude flight as a result of expansion of air bubbles trapped in the sealant.

Previous methods of avoiding such troubles have required a penetrating head operation—pulsing—which resulted in the compound with a heavy instrument that pover the bubbles.

Boeing has modified a solvent gun to overcome this difficulty. A 351-gal. gun is run both a speed through a container of solvent into a solvent gun chamber and out through a hole in the bottom onto another speed. A thin coating of the coating compound clings to the wet as it passes through the solvent container and is scraped off and left inside the gun chamber as the wet moves through the hole in the bottom. When the chamber is filled, the wet is removed, the hole plugged, and the gun is ready to use down a



**MUSCLE-POWER** solvent flows down into through hole in can's bottom.

## A single brake fire costs you more than converting to SKYDROL



**Cost of Brake Fire: More Than \$3000**

### Look at the figures for a 4-engine aircraft

Replacement parts alone, without labor, total almost \$3000. For greater than this is the cost of out-of-service time... the problem of interrupting schedules... non-scheduled removal from service... loss of passenger pay and mail pay.

### COST OF A BRAKE FIRE\*

(Replacement Parts Only)

Qty.	Brake	Net Price
2	Brake Assembly	\$ 800
2	Tires	566
2	Flexible Hose Conn.	30
2	Wheels	2915
1	Needle Switches and Wiring	55
2	Brake Lockout Cylinders	240
2	Shuttle Valves (Brake)	50
<b>TOTAL</b>		<b>\$3946</b>

\*based on ignition of flammable hydraulic fluid

**Cost of Conversion to SKYDROL: \$1700**

At time of overhaul, you can convert a 4-engine aircraft to fire-resistant Skydrol for approximately \$1700... less than the cost of a single brake fire.

Noncorrosive Skydrol is the only fire-resistant hydraulic fluid to receive FAA approval... it has never been implicated in an aircraft fire... Skydrol has exceptionally high lubricity... lengthens pump life... eliminates unusual oil.

Twenty major airlines now use this Monsanto fluid in more than 500 transport-type aircraft... Skydrol is available all over the world... at more than 70 airports outside the U.S.A. alone...

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## MB assured engine mount durability



The photograph shows how MB vibration isolating mounts were put to a grueling fatigue-strength test... to check the complete dependability of these vital engine supports.

A mount was linked between two humping solid beams. Vibration was applied by means of the MB vibration shaker shown. When resonating, the beams developed tremendous forces—enough to torture any heavy part into revealing structural faults.

This MB-engineered equipment actually applied over a million load cycles in the development of this single mount design alone. Result: Years later, still no reports of mount trouble in service.

It's the wider scope of vibration engineering that sets MB apart in its field. It shows up in quality of product.

the **MB** manufacturing company, inc.

1000 North Main, New Haven, CT, U.S.A.

HEADQUARTERS FOR PRODUCTS TO ISOLATE VIBRATION

TO EXCITE IT... TO MEASURE IT

## Faulty Control Cable Grounds Erconques

Detonation of the 12th cable within the control column of aerial two-place Erconque aircraft in California recently has grounded all Model 413 series of the aircraft for manufacture revision.

Inspection of an accident log, 6 at Van Nuys Field, proved that a control cable was broken as a result of fraying.

Inspection of other Erconques in the area by Civil Aeronautics Administration staff, again caused A. S. Rock, Director of CAA's Office of Airframe Safety, to order a quick inspection of all Erconques.

The order affected 2,000 Erconques throughout the country. They no longer are in production by Engineering Research Corp., Randall, Md.

The Erconque has had no major trouble good safety record," Rock says. This inspection is a precaution to be sure that cables have not deteriorated on aircraft in service and that this popular aircraft continues to maintain its safety record.

## USAF Revises Rules For Package Handling

Air force packaging regulations have been revised to insure ease, flexibility, to insure proper packing and eliminate improvement of national handling.

Under the terms of Air Force Regulation 71-1, each member concerned is given 60 days in which to designate one office to take charge of packaging and materials handling, regulations issued by USAF Headquarters and the Air Material Command.

Other responsibilities fixed by the regulation:

- Major commands will make sure all supplies, equipment and materials are in ready for use condition.
- AMSC will develop and recommend program for warehouse management of packaging and materials handling.
- Military Air Transport Service will screen all shipments, making sure they conform with packaging requirements.

## Bell Develops Bath To Descend Titanium

Bell Aircraft Corp. has unveiled a bath for cleaning steel dies but forced titanium parts in a production line. Descaling machine is a sodium hydroxide bath (75°F).

Parts contained in a mesh basket (16 in. long, three in. wide, four and a half in. deep) are immersed in the solu-

tion for five to 10 min., depending on the amount of scale.

This is followed by a spray of cold water and washing three or more times until the parts are free of scale. The parts are then dipped in a solution of nitric hydrofluoric acid, Bell reports.

Next step is a cold-water dip, followed by hot-water immersion to speed drying.

Etching process is reversibly handled by one unit repeating the electrical controls in an isolated bath.

The end is so constructed that it will handle castings, pressure cast, hot, cold, and, depending on which is most effective and economical.

## Navy Contracts

Contracts recently awarded by Navy's Aviation Supply Office, 700 Roberts Ave., Philadelphia 11, are:

**Adair Co., General Mobile Corp.**, 1001 Van Ness St., Berkeley, Calif., valves and valve seats, \$11,000.

**American Fuel Co., Inc.**, 1708 Broadway St., P.O. Box 101, New York 10108, fuel system components, \$100,000.

**Ben Pineda & Venzon Co., Inc.**, 27-10 72nd St., Long Island City 3, N.Y., 11105, various items.

**Bentley & Langston Steel Corp., Contract**, 1001 Van Ness St., Berkeley, Calif., 11,000.

**Blair Aviation, Inc.**, 1001 Van Ness St., Berkeley, Calif., 11,000.

**Boyd & Langston Steel Corp., Contract**, 1001 Van Ness St., Berkeley, Calif., 11,000.

**Boyd & Langston Steel Corp., Contract**, 1001 Van Ness St., Berkeley, Calif., 11,000.

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**Boyd & Langston Steel Corp., Contract**, 1001 Van Ness St., Berkeley, Calif., 11,000.



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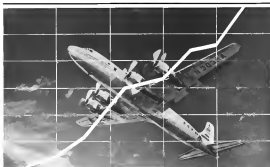
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**TUBE-FREE TUBE OPERATION** for 1,000 hours is forecast by Avco, in study of engine equipment in transport operations shown.

## Airline Tube Reliability Curve Goes Up

By Philip Klein

A large airliner such as the DC-7 or Super Constellation, with more than 300 electron tubes aboard, should soon be able to operate for 1,000 hours with very little likelihood of a single electron tube failure. This is a rather remarkable achievement as a case of airline experience with tubes only a few years ago.

Based on nearly two years of closely monitored airline tests on various-type tubes, Avco Aircraft Radio Inc. reports that "a tube failure rate of 0.1% (one failure per 1,000 tubes) for the first thousand hours of operation should be reasonable at the present time under optimum practical conditions of operation."

The Avco tests were conducted to provide a benchmark for comparing tube reliability in airline equipment (Aviation Week Apr. 3, p. 52; Apr. 10, p. 56) with that experienced in the services.

**• Detectable Deterioration**—Typical equipment, the Avco airline tests indicate that the vast majority of tube failures (93.4%) in position tubes are of the deterioration type, which can be detected prior to failure with suitable

test equipment. Only 6.6% were the unpredictable, catastrophic kind.

Avco's 0.1% estimate of first plane success optimum, in the face of the 0.5% to 1.5% failure rates actually experienced in the tests. However, these figures are based solely on the original 2,000 tubes which started the program in July 1951, tubes were manufactured two (and) four years ago. Tubes failing off the lines today are much improved, some of them as a result of the airline test findings.

Another factor is that higher failure rates were generally experienced in older war surplus equipment, like the ARC-1 VHF set, whose design practices were less conservative. "The tube tubes showed up much better in newer design surplus equipment. One of three participating tube manufacturers was also responsible for a preponderance of the high failure rates, indicating an individual design and/or manufacturing problem."

**• How Tests Were Run**—Six airlines—Delta, Eastern, Northwest, United, TWA, and Transair—participated in the Avco tests. The three tube makers—General Electric, Radiovac, and Tung-Sol—were referred to only as "A," "B," and "C" in the Avco report to prevent

competitive recommendations.

Approximately 2,000 tubes of eight different types were installed in four lots of airline service equipment: the Collins SIB, emergency receiver, the ARC-1 VHF communications set, the ME-12 audio amplifier, and the GE-201 communications receiver. (Not all airlines tested all tube types, nor in all four types of equipment.)

Seven of the tubes were improved (Avco) types: 5674, 5674, 5674, 5674, 5751, 5751A, and 5749. One was the GAX-5, conventional counterpart of the 5674.

**• Cross Checks**—In some cases, a specific tube type made by two manufacturers was tested in identical equipment by a single airline for competitive comparison. In still other instances, the competitive tests were run by two airlines to check out differences in individual airline maintenance procedures.

Whenever a tube failed, it was tested by airline personnel to determine, if possible, the general type of failure and a report was filed with Avco headquarters. The tubes themselves were returned to the manufacturers for a detailed failure analysis, which in turn was reported to Avco. At Avco, all

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**ATTACK ON CATASTROPHIC FAILURE** of engine tubes is made with the protection which trapez glass envelopes to strengthen them against later cracking.

data was recorded on purchases by supply analysis and tabulation.  
**First Findings**—Here are some of the other Arco conclusions based on tests to date:  
 • Failure rates remain fairly constant up to approximately 3,000 hours of operation, after which they increase rapidly, indicating that even pressure tubes

begin to wear out after a time.  
 • **Reliability** of improved tube types appears to be least generally by the amount of sand that can be carried away every detail of tube manufacture.  
 • Detonations between most pressure tubes due to leakage between tube bases and outside, or between other tube bases, resulting from conducting this

dependent on the resulting parts. Low transconductance was responsible for only a minor percentage of tube rework.

Arco notes that substitution of cathode materials on anodizing parts has long been recognized as a major cause of tube deterioration. Tube moisture films and others are attacking the problem, Arco says, but it adds that some research could be devoted to the better cathode leakage problem.

• **Catastrophic failures** were primarily due to cracked glass envelopes (3-4% of all rework), open heaters (10%), and open cathode tube (1.7%). Arco admits that it does not know how many of the cracked tubes were damaged during handling and transportation.

It notes that 50% of the open heaters were type 505 tubes used in the ARD-1, representing evidence of poor control design.

• **Increased vibration** during operation does not appear to have caused any of the rework, as evidenced by some tube elements except for one tube type made by a single manufacturer.  
 • **Competitive Differences**—Higher cathode leakage and transconductance deterioration was the principal defects complained in tubes made by company A, Arco says. Manufacturer W's general problems were with cathode tube leakage and gas. Performance two

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like for manufacturer C was fatigue be-  
tween electrodes, Amec said.

Amec compliments the participating  
tube makers for their keen interest in  
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in analyzing the cause of tube failures.  
As a result, Amec says it believes that  
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used in its tests.

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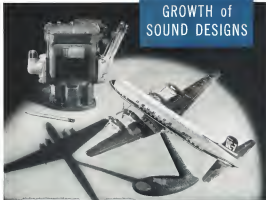
► **Sanitation: Flow Meter**—Watch for  
General Electric's Motor Department to  
announce a new version of its mass flow  
meter (ENR/June 18/June 25, 1979, p.  
71) which uses up fast flow rates to  
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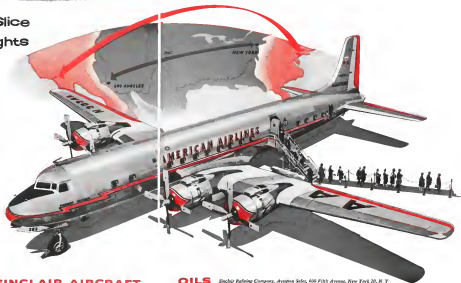
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► **Mohawk to Test for GE—Molokut:** Airlines will operate a newly purchased DC-1 as a flying laboratory to test engine equipment developed by General Electric's advanced division in a test lab, located near Molokut's main base of Hones, N. Y. Tests are expected to run for one to two years.

► **UAL Buys Bendix BRS—United:** Air Lines has ordered 250 NM-100A glide slope receivers from Bendix Radio for a fleet-wide installation. New receiver has 28 channels compared to an available on older UAL receivers. Bendix describes the order as "the largest of its kind ever placed."

► **RCA Enters New Field—Radio Corp. of America,** which is actively working on digital electronic computers and data processing machines is under contract to set up an electronic inventory system, called *Binpac* for Army Ordnance.

► **Sch-Mil Technology Report—Sch** manufacturing Techniques for Low-Frequency Receivers" is the title of a new 64 page report by the National Bureau of Standards covering the actual phase of its continuing program to develop manufacturing for airborne equipment. NBS Circular No. 543 may be obtained for 75 cents from Government Printing Office, Washington 25, D. C. —PK

## Avionic Bulletins

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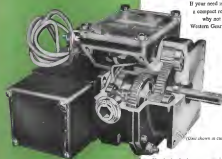
- A two-volume set designed to assist the construction of frequency converter is described in *Avionic Bulletin* C-27-1000, P.O. Box 10, Rockville, Md.
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## EQUIPMENT



MAINTENANCE of fastener system is simplified by Conbar fastener on screw panels

## Jets Try Fast-Opening Fastener

New quick-operating units are designed for highly stressed points of highspeed aircraft and missiles.

By George E. Christian

Famous, N. J.—Conbar Fastener Corp. is ready to bring into production its new type fastener for high-speed jet and missile applications.

Called the Conbar stressed panel fastener (SPF), it was built quickly the highly stressed areas panels need no tedious screws. It is a stress-tension torque fastener device with greater tensile strength than any available fastener, according to its manufacturers, yet allowing the quick operating feature of a quarter-turn fastener.

The SPF is being tested by Chance Vought for the F3U and can missiles, and Sikorsky is testing it for missile applications, according to Arthur Fox, Conbar's division sales manager.

The device, which is used to work on

a completely new fastener principle, has proposed from prototype to pilot production, and will move into full-scale production as soon as the company is certain that no further modifications to the device will be required.

**New Approach**—R. Norstrom, Conbar's chief design engineer, cites these advantages of the stressed panel fastener (currently available only in a size comparable to NAS 547 Size I).

**Fastening torque**. SPF fasteners have a very long service life. The penetrating torque feature of the fastener is built into the screw through one thousand cycles, in as much as the approximately 250 cycles of a typical self-locking nut used on a plate nut assembly, Conbar says. Rebuilt is greatly reduced maintenance, since replacement frequency is not 75%.

Contributing to this long torque life

is the use of an interlocking wedge between the nut and body of the fastener which are built control ribs, rounded chamfers, and serrated slots. A three-quarter turn of the stud completely locks the fastener (in opposed to 6-8 turns for a standard screw), and on moving parts a greatly reduced.

**Speed operation**. Conbar's fastener is made in buttressing or "subtension" (on engine moving, for instance) by means of the three-quarter turn locking feature, thereby cutting maintenance time.

**Building corner shear loads**, allowing stud to own freely and avoiding having a control screw and possible cross-threading.

**Flag action of the stud** means that only the proper length is used. If too long or too short a stud is used it will not fasten. And because the locking feature is built into the fastener, it is not possible to be popped up by spring action, an incident flagging the fact that it is unlabeled. It also eliminates the possibility of meeting a screw too short to do the job, thus weakening the fastening.

**High vibration resistance** of the stud is insured since it is held in the buttressed position by a spring-loaded detent pin. SPF meets vibration test requirements of AN N 58, according to Conbar.

**Stud assembly is secured** to the outer panel assembly when unlabeled, preventing it from falling out when panel is removed.

**General building** for the actuator ring and brackets of the stressed stud assembly allows maximum angle for used to approach the frame and permit 90 deg. included angle between fasteners when installed on curved panels.

**Simple installation** fasteners are of fixed by fastening sequence.

**Depth of 22 Phillips head screws** is standard application of at least 50 in. D torque on the stud.

**Last screw problem** is eliminated by permanently attached (not removable) fastener.

The SPF Series 4F fastener meets the structural requirements of NAS (National Aircraft Standards) 547 types A and B, class 1, size 1, entry quick release, high strength fastener, according to Conbar.

**How it Works**—When the stud is inserted the first 50 deg. the stud should then engage with two slots in the nut. As it continues to turn, the top of the stud is inserted into the nut, and the screw which then rotates with the stud and is screwed down on the intermediate web flange. The action drives the panel securely to the aircraft's structure.

If the stud is either too long or too short, it will not engage with the nut and a pushed partially out of the







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DRY WEIGHT	1.625 N.W. maximum 400, 500 Ohms
WET WEIGHT	-10°C to +40°C (also available -100°C on request)

6 pin version  
Designed to meet requirements of types  
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are done attached to the surface.  
This chamber being to remove door  
completely and get it down some  
where where it might be damaged in  
slow motion. It also demonstrates the all  
sensitive wiring method of having  
a cable and two strapping screws, with  
an end nut to secure the door to the  
surface.

• Features for high-temperature ap-  
plications, pressure sealed enclosures and  
detectors to resist adverse corrosion  
conditions.

• Several types of door gaskets which  
can be used with standard studs and  
receptacles.

Canine has been in the fastener  
business since 1916 when the firm  
first started developing and producing  
the units. In 1946, the company  
moved to a new, modern facility at  
Pomona, N. J., where it concentrates  
all of its engineering, production and  
sales. The firm also has a West Coast  
office at 5416 Wilshire Blvd., Los An-  
geles.

### Gasket Cutter 'Clicks' for UAL

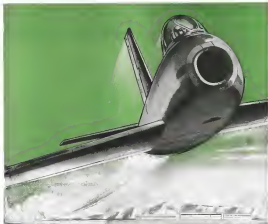
A machine tool "borrowed" from the  
door industry is used at United Air  
Lines' maintenance base in San Fran-  
cisco to turn out a large variety of  
gaskets at half the usual cost. One heli-  
coil gasket which the workload turns out  
costs 16 cents (material and labor) com-  
pared to \$2.90 charged by the supplier.

United leases the tool, called a "click-  
cut" machine, from the United Shoe  
Machine Corp. for \$25 a month. With  
the clicker, UAL produces over 200 dif-  
ferent shapes, kinds and sizes of gas-  
kets, out of rubber, leather, neoprene,  
cork, pressed paper, plastic, and other  
materials. The machine also turns out  
leather and rubber for the upholstery de-  
partment. These gaskets for overhead  
doors and UAL cut cover cables.

The shaker is mounted on a turn-  
out iron stand and is powered by a  
1-hp motor. A steel frame supports the  
work surface, which is a 12x18-in.  
hardwood table 5 in. thick. Gasket run-



CLICKER ready to tap out gaskets.



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# A-C SYSTEMS FOR AIRCRAFT

**GENERATOR**

**VOLTAGE REGULATOR**

**CONTROL PANEL**

**CIRCUIT BREAKER**

ISOLATED OR PARALLEL SYSTEMS



## JACK & HEINTZ

# ...a report from JACK & HEINTZ

## Wide range of a-c systems... result of expanded J&H Generator line

Jack & Heintz now offer the aircraft industry complete alternating current systems and components "tailored" to meet the demands of tomorrow's high-performance aircraft.

With the expansion of its a-c generator line

and extensive experience in the development and production of a-c control panels, regulators and other auxiliary components, J&H can now supply a-c systems ranging from 0 through 120 kv. These systems are capable of isolated or parallel operation.

### MAJOR SYSTEM COMPONENTS

**GENERATORS:** Designed to MIL-G-6000 and applicable drawings, J&H Generators are among the smallest and lightest yet developed. Available models include cooling by blast air, oil or vapor.

Important features include:

Light weight — High efficiency  
Low harmonic content — Phase indicator

\*Batteries required by MIL-G-6000 and applicable drawings

**CONTROL PANELS:** Designed to applicable SAE and Navy specifications, J&H Panels can also be built to special requirements. They can operate either from the bus or independent of it.

J&H Panels include any or all of the following functions (which can be applied to individual components, if desired):

Generator control relay — Over voltage protection  
Motor/stop protection — Phase sequence protection  
Run — Under speed or under frequency protection  
Arresting — Power indicator — Field finding  
Special interlocking

Overvoltage relay is sensitive to modulation losses

**VOLTAGE REGULATORS:** Designed to MIL-G-6000 and applicable drawings, J&H Regulators are of the static-magnetic-amplifier type. With only twelve and one-half pounds, the regulators feature a magnetic reference eliminating the use of electronic tubes. Provisions are made for adjustment for accurate load division between.

**CIRCUIT BREAKERS:** Designed to MIL-G-6000, J&H Circuit Breakers have the following outstanding features which make them exceptionally well suited for use on high performance aircraft:

Reliable rotary lock  
Direct release without external  
Mechanical adjustment of release contacts  
Easy inspection of main contacts

**OTHER COMPONENTS:** In addition to the general functions which can be supplied to individual components, Jack & Heintz has developed transformers, reverse power relays, phase sequence relays and other auxiliary a-c system components.



Jack & Heintz engineering personnel and manufacturing facilities are geared to undertake design and production of complete a-c systems or individual components. We invite your inquiry. Write Jack & Heintz, Inc., 17635 Broadway, Cleveland 1, Ohio.

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## Rotomotive AIRCRAFT EQUIPMENT



## Private "air truck" for Very Special Delivery ...powered by Lycoming

When deliveries are fast with a capital "R"—that's progress in business terms in a small company plane that refuels, has all dependents on the schedule of commercial air traffic volume.

Take the case of the Capital City Printing Plant Company of St. Marys, Ohio—sponsor of a Piper Tri-Pacer powered by Lycoming. Greg C. Wilson, General Manager, says: "We could not maintain our production and sales level without the Tri-Pacer. The airplane and the pilot do the work of two trucks and three drivers. We save a lot of expense and keep our customers well satisfied."

Our own experience at Lycoming with the Tri-Pacer is a revelation in dollars and cents. It carries a 300 lb. payload at an operating cost of only 3-6¢ per mile—far less the average cost of running an automobile!

For the "air truck" in your fleet, look for a Piper—or one of the other leaders in the small plane field that fly with dependable Lycoming air-craft engines.



Job done in minutes with Lycoming's new V-1000. Great for the small plane, too. This is a 100-hp engine, the first ever made in the U.S. The price has been cut to \$1,995.00. The price has been cut to \$1,995.00. The price has been cut to \$1,995.00.



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level is installed from a shelf behind the table. The dial is fast over the material, the operator swings the beam over the dial and pushes a handle actuating the beam. A sudden, even pressure is applied over the whole working surface, thus the beam returns to position automatically. Its height from the work table is adjustable.

Some 14 types of dies are used with the diehead.



NABE belt-powered grinders.

## Solar Gets Lockheed Order for Mars Units

A \$1-million order for Mars gas has been received by Solar Aircraft Co., San Diego, from Lockheed Aircraft Corp. The 300 hp units will go into Lockheed C-130C Super Hercules to be operated by Military Air Transport Service. Order includes original equipment plus spare parts. Douglas Aircraft Co. recently increased its order for the same units to be used in its C-124 Globemaster transports, to a total \$5 million.

## OFF THE LINE

Breda Radio RA-35 receiver and TA-15 transmitter will be installed as standard equipment on C-130 Hercules' fleet of airplanes, including the three Vietnam Vietnam ones to be put into service, the manufacturer announces. Two other airplanes have recently been ordered by the RA-35 and TA-15 are National and Delta C-130. The equipment is a VHF communications system which provides 160 critical-casualty channels.

Hardware Electronics and Breda Radio have sent a two-page "DME packet" to a three-month trial of the country to give manufacturers information to order distribution for the Breda DME system.

## NOT JUST A NEW MODEL—but A NEW CONCEPT

### in recording oscillographs



Optically flat cathode ray tubes are permanently fixed in the unit to ensure photographing and adjustment.

**Now**—the first significant basic advance in multi-channel recording in over a decade, the new Miller CE-1 Cathode-Ray Recording Oscillograph breaks through the "Is It Better?" and makes it possible to record up to 16 separate channels or frequencies as high as 50,000 cycles per second. High chart speeds and a patented Miller Optical System provide excellent resolution and clearly readable, permanent records.

A completely self-contained instrument system in a single cabinet, the CE-1 is a convenient, ideal solution to many of today's—and tomorrow's—research and development problems. Key features include:

- 16 independent channels on 8" photographic record
- Continuous recording of phenomena as high as 50,000 cps, any frequency
- Record speeds from 3" to 400" per second through push-button controls, record lengths to 300 feet
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- Automatic record identification and reference from recording
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with hours about 2,000 feet and tops to 14,000 feet.

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A departure from Dallas these later weather sequence reports and forecast.



### Fort Worth, Look Out!

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weather for months, together with winds died for the Dallas Atlanta case were attached to the flight's classmate, as were the severe weather forecast and pilot reports previously mentioned.

Dallas flight dispatcher center is at Atlanta, and has direct communication with its stations along the route involved. Flights as made can be conducted without delay by radio from Atlanta or by way to, and return from the several company stations. General weather reports and forecasts from the U.S. Weather Bureau are received by Memphis and the Dallas Shreveport and Atlanta company offices. Investigations disclosed that on May 17 at the time the incident occurred, including the dispatching and monitoring of Flight 311, were normal and satisfactory.

During the flight of 111 VFR conditions with good visibility prevailed from Dallas to Marshall. East of Marshall occurred the dramatic crash and it appears that falling in a corner of the horizon there was some confusion with tops probable at 10,000 to 15,000 feet. One of these storms was no cause between Marshall and Shreveport. Its location from stations both on the ground and in the air indicates that the thunderstorm was plainly visible from the west side, but did not look quite as severe as it did from the east and southeast sides. Witnesses also indicate that the storm was local and could have been better avoided, as fact another flight did go around it. Dobb's Flight 311 was seen by several witnesses to be in the storm.

Investigation indicates that the thunderstorm was first noted north of Marshall moving rapidly eastward. During that time it was picked up as an intense echo on the radio scope at Dallas Field. A 51 & Air Force reconnaissance flight was then dispatched to investigate the storm to determine its probable course. As the flight and low altitude (Dobb's) flight from Shreveport in a C-47 (D-36) of 1940, about 15 minutes before the accident.

They proceeded northeast in the direction of Marshall. Yes, toward the thunderstorm and observed weather conditions over the Shreveport area to be 4,000 to 5,000 feet, centered in "looking" check, visibility was limited. However, as the C-47 approached the storm area the ceiling began to show through decreased to the proximity of the storm.

The estimated height of the base of the storm cloud varied from approximately 1,000 feet at the outer edges to near level over the center. Heavy rain and severe cloud-to-ground lightning was observed in the thunderstorm. The Air Force pilot then advised the storm to the north and west and while flying at an altitude of approximately 1,500 feet MSL, Dobb's was level on a south westerly heading. He observed a Dobb's DC-1 approximately 1000 miles south, and at about the same altitude, headed on a straight southeasterly course toward the storm. As fact he watched the Dobb's maneuver in what appeared to be a gradual circling attitude, until the storm had dissipated at about 1415. At no time did the flight report an instrument flight rules clearance.

The Air Force pilot indicated that at all times he flew visually and that he was able to stay clear of the thunderstorm. Once

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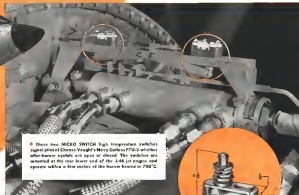
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when he approached quite close, while on the east side, candidate turbulence was no constant. He himself was aware that the storm had no sense in going with safety. At one time while skirting the storm he noted a "small" form under the cloud, however, then came upon, regardless of a trouble development, extending from the cloud but not reaching the ground. He also stated that on the east side the storm was as black and dominating as any he had ever seen, but on the west side, the only that the rain was falling in, it looked very low threatening although heavy rainfalls and rain could be seen.

Other witnesses on the ground near Mac said that the storm was quite severe. Some stated that they observed the Duke aircraft proceeding in an easterly direction toward the storm in straight and level flight. Others pointed out to the authority of the storm. They stated that there was very heavy rain with but for a very short period of time, and that the wind seemed to be quite strong. There was no evidence, however, in the vicinity of the crash, of any disturbance towards either such as the opening of trees or damage to property. The only surviving passenger, who was on her last flight, stated that the light seemed normal and that she was along most of the trip. She

The purpose of the military program was to test the ability of the aircraft to operate in the presence of a storm, and to determine if the aircraft could be used in such conditions. The program was conducted in the presence of a storm, and the aircraft was found to be capable of operating in such conditions.



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and he sat left behind when the aircraft entered the storm area, and he lost oxygen also was that the left wing of the airplane was down, the remainder nothing further could after being rescued.

Capt. York had been involved in combat with the Delta since May 1941. The first as a captain on the 8th Air Force from June 29th until May 1943, when he was assigned to a ground school (GCT) captain. His last flight time with the company was 7,000 hours, nearly all of which had been on DC-3s. His last scheduled check in March 1943, was satisfactory, as was his last medical check on May 22, 1943.

The company's operations ceased, with which the captain should have been involved, and both.

\*1912.3 Completion of schedule takes final check and is considered of major importance after safety and insurance covered.

\*1912.4 It is the policy of Delta Air Lines to discontinue flight operations as soon as possible.

\*1912.5 It is the policy of Delta Air Lines to avoid flight through turbulent or by reason of altitude, to ensure as high as practicable to avoid such flight, the effect of



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turbulence shall be limited by reduction of speed."

## ANALYSIS

Twenty-two minutes before the accident the flight resumed and advanced toward the vicinity at Shafterport, its next scheduled stop. This section was dark, scattered clouds at 1,000 feet, ceiling estimated 4,000 feet broken clouds, overcast at 33,000 feet, visibility 10 miles (transmission, light was shown, and south 30. Remarks: some thunderstorm activity, occasional lightning cloud to cloud south. The thunderstorm was centered with no known change of altitude (over 1,500), and with no apparent attempt to change course.

About 1402, with Shafterport only 31 miles ahead, and reporting good ceiling and visibility, the captain suddenly stated that he was in the clouds and he wanted VFR which he could have done, but then directly into it, and in so doing sent contrary to Civil Air Regulations, as well as to company directives. The crash occurred about six miles beyond his point of entering the storm and only seven to eight miles at eastern, or the edge.

The thunderstorm in which the crash occurred was very active at the time the flight went into it. (Lightning is sharp, and about ten to twelve miles in extent. Heavy to severe turbulence was indicated to have existed, including various winds (primarily did not become surface breezes). This was not known by the captain at the time. Flight and he may have believed that the storm did not look too severe. Although he may have further believed that the Air Force plane had come through it, he should have known that the storm was local and could be by passed (it was visible in fact, and that pilot had already encountered heavy downbursts with heavy turbulence and damage on his ground run. He was getting into a thunderstorm, one which he had to do but had been forecast to possible delay involved, and it had been suggested to him to ground personnel to by pass the storm in the north. In spite of this known fact there appears to be no logical reason why Capt. Vail did not alter his course to avoid the storm, assuming an adequate air structure required him to by-pass thunderstorm when possible.

The cause of some of the conditions which the storm caused for the aircraft. However, it is known that the storm appeared to be a very severe one, with some ceiling conditions and extremely heavy rain accompanied by loud with strong gusty surface winds and sharp cloud topward lightning. These factors are indicative of other conditions such as extreme turbulence accompanied by violent updrafts and downdrafts. It is known that turbulence, if sufficiently severe, is capable of causing an aircraft uncontrollable. Incidents have been known to relate only to turbulence, even in a shock-mounted plane, to indicate that they become unstable. At least one incident showed no evidence of lightning activity, there may be the possibility that lightning strikes temporarily blinded the crew members, since clouds

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ground lightning of strong intensity was seen by us and ground witnesses.

The aircraft's attitude, level laterally and in a slight descent with power being decreased when it struck, then and continuously obscured the possibility of lost control.

Considering the possibility that the pilot, after encountering instrument flight conditions as his attitude was descending to establish visual contact, it may be assumed that the pilot was faced with a combination of serious hazardous conditions described above, but control of the aircraft and its inability to effect recovery in time to prevent impact with the tines.

The Board is well aware that the loss of ground proximity and therefore a few times being an exact witness, and that scheduled flights must frequently traverse an extremely hazardous, but a few long hours held to be good practice to alter thunderstorms when possible either laterally or vertically, as last. This is a statement that variations are possible and the Lewis-Worthen Bulletin, previously mentioned, did indeed provide procedures not too distant. Delta's operations manual particularly presented avoiding thunderstorms, but could easily have been done in the case.

### FINDINGS

On the basis of all factors evidence the Board finds that:

1. The crew, the crew and the aircraft were not qualified for the subject flight.
2. The crew had prepared adequate written instructions against the immediate meeting of thunderstorms.
3. The captain should have had level edge of their emergency instructions.
4. While on one, close to and approaching the storm, it was suggested to the captain by company ground personnel that he rise with the storm to avoid the thunderstorm.
5. The captain flew directly into the storm without changing course or altitude.
6. The captain while on a survey pass received from VFR into IFR weather without first obtaining an appropriate IFR clearance.
7. A very intense localized thunderstorm, accompanied by frequent cloud to ground lightning, had heavy rain, hailstones and high winds, was entered by the flight.
8. The flight met extraordinary conditions within the storm and was forced to the ground.
9. The crew's dispatching, pilot briefing and weather dissemination, was satisfactory.

### PRELIMINARY CAUSE

The Board determines that the probable cause of the accident was (1) the encountering of conditions in a severe thunderstorm that resulted in loss of effective control of the aircraft, and (2) the failure of the captain to adhere to company directives requiring the avoidance of thunderstorms when conditions would allow such action.

- By the Civil Aviation Board:

By: Donald E. Ryan  
By: Herman D. Davis  
By: Jack Lee  
By: Joseph F. Adams  
By: Chris Conroy



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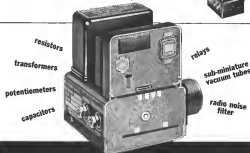
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Barber-Colman Company, Bedford, H., is well known for its varied line of aircraft temperature and positioning control systems, actuators, air valves, and other accessory equipment. In designing the electronic temperature control shown here, they required a potting material to protect the fragile components and the connecting wiring. It was necessary that the material be leak tight and strong, have good electrical insulation properties, and be impervious to salt spray and humidity. Curing temperature was not to exceed 250° F., and after curing had to withstand ambient temperatures up to 250° F.

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A navigation chart holder that holds and lights flight information near the pilot's line of sight, but out of his way, is offered by Jeppesen and Co.

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Jeppesen and Co., Stephen Ashfield District, Colo.



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The camera is intended for use in combustion, corona-discharge, explosion, plastic and elastic deformation, and shock wave phenomena investigations.

An image of the subject matter is focused on the tubular mirror through a highly corrected 24-in. spherical lens. The image is reduced, 1 to 1, to the film plane as a 30-in. video through 15 pairs of adjustable schottschmidt glass-coated, 500-line/mm lenses are located at each image position within 6 000 in. of the film cassette. A total of 25 frames per sec. may be expanded on stationary, perforated 35 mm film.

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Johnson-deVries turbine gives the motor at 1,000 to 10,000 revolutions per second, while the Model 100 employs an air-driven turbine to attain up to 5,000 rpm speed.

The control is controlled from a radio-mounted unit, which can be located up to 75 ft. from the control. The control unit contains an engine-speed limit (EPL) meter which measures engine turbine speed, a variable time delay generator by means of which the control may be synchronized with the engine position in engine from No. 1 at the beginning of the event and controls for turbine speed and timing of the event to be recorded.

Ballistics & Whiffles, Inc., 766 San Carlos Ave., San Carlos, Calif.



Pocket comparator in locate case.

#### Precision Comparator Comes in Pocket Size

A new precision optical instrument—the "Per-Cor" Pocket Comparator—has been introduced by National Tool Co. to measure extremely small parts or accurate dimensions of large parts.

Measurements are accomplished through a powerful magnifying lens (approximately 6 power) and small transparent patterns called readers. Some of these readers, which are actually no thicker than paper, have been developed for the unit.

- Bodies. Measures dimensions from .0025 to 6.5 in., in steps of .0025, and 0 to 6.50 mm., in steps of 0.2 mm. (This is supplied with the instrument.)
- Radiuses. Determines radiuses from 0 to 6 in at steps of .1 in.
- Angles. Protector shows angles from 0 to 90 deg. in 5-deg. increments.
- Threads. Measures threads per inch with scales for 8, 14, 16, 18, 20, 24, 28, 32 and 36 threads per inch.
- Thickness. Also sold and optically scales to measure thicknesses from .002 to .016 in steps of .001.
- Diameters. This scale scales for mea-

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**Locking insert** has grip end that locks screw against vibration, provides high strength thread, and automatically locks itself into preset oriented position of pin, ring, etc. Now being used for crew fasteners by one aircraft company.



The new insert may be incorporated into otherwise known designs because it requires no insert hole material or wall thickness than conventional tapped thread, tap under—Eck-Cell Corp., Danbury, Conn.

## FASTENER PROBLEM



## Lightweight, high strength fasteners for midget A-bomber

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## The plane that prevented a war and TEMCO'S part in building it!

Convair's B-36's and the rest of SAC were about all that stood between this country and its enemies in the late 1940's and early 1950's. Many feel that this team prevented a third World War. Today, as then, they are powerful deterrents to any world aggression. Production of those giant planes required thousands of man hours and involved many problems. Convair helped simplify production by sub-contracting elevator, rudder, and door assemblies to TEMCO.

This is but one of many jobs wherein TEMCO has helped speed the Nation's defense effort. And it is one of the many jobs that has earned TEMCO the reputation for delivering a quality product, on schedule, at one of the lowest costs in the industry.



Great B-36 elevator doors TEMCO worked on as it was wheeled into wet spray booth for its last coat of paint before being shipped to Convair, Ft. Worth, for final assembly.



## AIR TRANSPORT



## TCA Tells Why It Chose Vickers Viscount

- Canadian airline says faster, quieter turboprop has more public appeal than its competitor, Convair 440.
- Officials also outline major changes being made in the transport for below-zero operation in North America.

Montreal—Trans-Canada Air Lines says it picked the Vickers Viscount because it is faster and quieter than its nearest competitor, the Convair 440, and because its turboprop engine is at the start of its over-ride the 1970's piston powerplant, in TCA's opinion, has reached maximum development.

Airline officials believe the British turboprop's speed edge (1515 mph. max) will give the Viscount more public appeal than the U. S. jetliner (1514 mph) and that it will be a substantial advance in air transport aircraft.

Passenger also prefer a turboprop aircraft to one with only two power plants, they say.

In addition, TCA expects the Viscount to be less expensive to operate than the Convair after initial index fluctuations.

• **22-Turboprop.** Fleet—Trans-Canada ordered its total Viscount order from 15 to 22 two weeks ago and announced that the first is scheduled to start flying the Montreal-Toronto-Winnipeg route Feb. 1 (Aerobase Week Sept. 6, p. 14).

Twelve or 13 of the latest 700 turboprops are expected to be in operation

on routes in Eastern Canada and the U. S. by April.

By May 1, TCA also will transport North Star aircraft service daily between Toronto and New York and Toronto-Chicago. On Sept. 25, it will start daily Super Constellation flights Montreal-Toronto-Winnipeg-Vancouver.

• **150 Changes.** When Trans-Canada takes delivery on the first Viscount 700 late next month, the transport will have about 210 major changes suggested by the airline to Vickers.

These also aimed to fit the turboprop in with existing methods in North America, because of public acceptance on the comfort of passenger comfort and ease of servicing and maintenance, says TCA chief engineer Jack T. Drouin.

They vary from a new cockpit to changes at flight condition in the landing for smooth, handling.

• **Increased Safety.** The gross weight of the aircraft has been increased from 18 to 19 tons, the landing weight from 16 to 17 tons, and the max fuel weight from 47,000 to 49,000 lb. Increased weight of the airplane has been made possible by lowering the Rath-Rayor

Dart engine transport, selected with no additional powerplant weight in excess to the engine, and at no increase of fuel consumption.

Much auxiliary equipment was installed to reduce the load on the pilot, to increase safety and reduce the time allowed in operations. Drouin told Aerobase Week at TCA headquarters here. The entire cockpit, for example, was redesigned to allow easier pilot to operate the Viscount alone in case of necessity.

Standard American instruments are being used, excepting those associated with the engine. British engine instruments designed for the Dart are being used, as are British automatic radio direction finding equipment. Other radio instrumentation listed in the plane is standard U. S. design similar to that used in other Trans-Canada aircraft.

Sliding windows in the Viscount cockpit have been redesigned to increase visibility and to permit a crew member to get his head out the window. New glass has been developed for the Viscount to act as the main deicing system for the windshield. It is being maintained in an anti-icing mode of deicing.

A third windshield wiper has been installed to cover the outer windshield panel. Automatic preheating and stepped speed control has been incorporated in the windshield wiper system.

• **Below-Zero Flight.** Because of greater cold-weather operations, TCA flew a



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## IATA 10th General Meeting Opens

### Profits Dwindling, Hildred Warns

Director General says heavy taxes and high operating expenses are narrowing the cost-revenue margin.

By Frank Shea, Jr.

Paris—Opening the 10th annual general meeting of the International Air Transport Association here on a sober note, IATA director general Sir William T. Hildred warned that the world's airlines are experiencing an "enormous shock wave" and that despite mounting business their financial situation is deteriorating fast.

In his annual report, Sir William told the assembled airline presidents and delegates from more than 40 countries that "we face much more difficult margins we pass during the day over the cost of operation and the demands of the tax collector."

• **Crisis Period**—The margin between airline costs and revenues, he said, "has steadily narrowed down until it is, in many cases, nonexistent. One can hear no more, indeed or otherwise, as the new forces which are expected to change this balance."

The industry's acute hope of getting through this critical economic period, according to Sir William, lies in two directions:

- Further intensive internal streamlining of airline's commercial and administrative systems;
- Some other thought and action, and a little self-restraint by governments, particularly on taxation.

The airlines now are collectively paying almost 15 cents of every dollar they collect to governments in taxes and charges, and are left with only one cent with which to pay interest on their indebtedness, satisfy their shareholders and keep in reserve, Sir William pointed out.

Meanwhile, he said, present and proposed new passenger taxes and landing fees are "a painkiller for the break on the nose and a disaster for the shoulder airlines."

He added that this is particularly true in Europe.

• **Action to Governments**—In a statement directed at the governments, Sir William warned that "you cannot expect to reduce airline by increasing taxes, to increase investment by reducing revenues and to get expansion by draining off reserves. In short, governments cannot expect to have their cake and eat it too."

In his appraisal of the economic state of the industry, IATA's director general said the costs of the airline operating revenues now operating costs has dwindled from 6% in 1951 to 1.6%

in 1952 and, on the basis of preliminary 1953 estimates, is now only 1.1%.

• **Blocking** that the actual situation is even more dire than these figures would seem to indicate, he cited the following:

- During 1953, the world's airlines had a global operating profit of only \$27 million on a basis of \$2.1 billion.
- Carriers were forced to absorb in their operating costs a total of \$140 million in fuel, lubricants, payroll, customs and excise taxes, payments of landing fees and charges for air navigation facilities.
- Airline that did reduce profits were forced to pay a further \$60 million more than losing the industry-wide profit, an operation income base.
- **Subsidy Picture**—These results reflect the effects of some government aid to airlines, but include that further subsidies have been needed to cushion the losses suffered by some carriers, IATA's director general said. "But, being admitted the cost of subsidizing, let us look at the figures again and ask whether it is possible to keep an important industry going without subsidy on the international market."

I have said, he said, "the development of actual figures of what airlines pay out—or back—will lay at rest, once and for all, the idea that our industry pays more for the public good."

Sir William further stated that a particular dilemma of airline management is that on the one hand, both public policy and the private aviation demand that carriers operate on some business principles and pay more out of return. On the other hand, public policy also demands that airlines pay out certain services that are not fully paid for by the government and that they pay heavily not only for aviation but for the privilege of doing so.

• **Government Policy**—he said, "must allow the airlines to build up reserves in that they can expand and develop according to sound commercial prudence. Where, at the request of a government, the airline undertakes operations that will benefit the community but result in a loss to the enterprise, there should be adequate government compensation."

"What the airlines in an industry need today is not, in truth, any more subsidies but a more efficient way of doing business with some stability and continuity. They need some assurance against economic crises. They need a chance to plan ahead on the basis of known

costs. And they need to be allowed to accumulate sufficient reserves to finance their plans once they are made."

"Given all of these," Sir William said, "they may still need government assistance, but they will need a good deal less in the long term than they would as enterprises which are handicapped in money, in justice or in hope."

• **Traffic Growth**—Sir William estimated that IATA member airlines are now carrying 65% of world scheduled air traffic, both domestic and international, outside China and Russia.

He pointed out that traffic still is crowded in all categories during the past year over 1952 months, but added that while passenger traffic rose 14%, cargo traffic rose by only 4%. He reported development in the total 7% increase in aircraft, "conversely this reduction in the size put the others by period transportation."

Stressing the importance of development of the air cargo market, Sir William said, "The facts are clear. Passengers from here have been reduced to the point where the carrier's margin is extremely small. Our compensation for carrying mail has been cut without a corresponding increase in volume from lower postage rates to the public. Our marketing, however, for cargo, has been cut, and the industry is in the 'red' field."

He admitted there is no "income and proven perspective by cargo operations on a worldwide basis," but said "the cargo rate structure needs careful examination, and I hope myself that we can find ways to reduce its level substantially."

"We cannot expect much improvement in the cargo rates we have," he said. "We have studied the point where the postage, as well as the economy of the airlines is at stake. And if it is needed, we can take comfort from the fact that we have taken equal steps in the passenger field and they have paid it."

• **Although Growth**—On expanded aircraft service, Sir William reported that airlines in both the eastern and popular part of the type services during the past year has been "both modest and disturbing."

Soundings a note of criticism, he said, "Nevertheless, the expansion indicates that in some cases, expansion of services from first to fourth-class has been too swift and overdone." He pointed to some lower first-class passengers have been reduced with frequent pay cutbacks. Sir William advised airlines to keep their aircraft as fully adaptable as possible "because we are still in a period where the elasticities and differences between first-class and lowest are not completely overcome."

• **Copied Interest Rising**—Citing the intense interest in helicopter development in virtually every country, and operations growing rapidly, Sir William said the



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## THE NEW U.S. AIR FORCE

Following is the third installment of extracts from a report to Congress made by H. Lee White, then Assistant Secretary of the Air Force, outlining management and operations aspects of the Administration's current drive for more efficient use of USAF resources—manpower, money, facilities and material.

Management & Operation II  
MANAGEMENT CONTROL SYSTEM

Implementations of the work measurement system revealed the necessity for a completely integrated management control system in the maintenance engineering activity. As a result, it is now planned to extend the project to include the integration of production control, standard cost accounting and payroll distribution systems with work measurement. The ultimate objective, of course, is to have these systems integrated and placed in effect at the end of the remaining seven Air Materiel Areas and two Air Force districts.

## REDUCTIONS IN TRAVEL

9. We have taken the following steps during fiscal 1998 to reduce travel:

(A) With the reduction of combat crew requirements for Korea, some crews were in the pipeline. In assigning these people, we took into consideration the locations of their families and, where possible, assigned them to stations nearest their locations. This eliminated dependent travel in some instances and reduced it in others.

(80) As of Aug. 1, 1993, we began filling overseas requirements for some three-level skills direct from the technical schools instead of leaving on the commonside.

(C) We anglicized dependent towns in the Far East, thus reducing suburban tract of families.

(2) We established a policy to interview only graduates of professional schools for various universities and make two assignments from that school, thus allowing one travel more per individual. Besides, we studied the qualifications of various officers returning to the United States to monitor their eligibility for school and made the assignment to school as far, advanced in the United States other than directing them to go to a Zone of Interest unless before going to school, their character was such that:

(E) As of Oct. 3, 1951, we established the rule that serum must have at least 16 months' Zone of Infection incidence between serum tests unless the serum volunteers for serum duty prior to the expiration of the 16 months and at the same time is made available by command, in which case 12 months' incidence in the Zone of Infection is required.

(F) We required that officers and survivors have at least 18 months attainability before being assigned overseas instead of the 12 months formerly required, thus achieving a lower attrition loss.

(G) We directed that ROTC officers assigned to their first Zone of Interior station not be reassigned overseas unless they volunteer to stay in the Air Force longer than two years.

(10) We authorized the extension of services here to a maximum of 48 months on a voluntary basis.

## CIVILIAN CLASSIFICATION SURVEYS

10. In the latter part of 1953 a test study was started to determine whether there was any duplication in civilian-military personnel studies and whether there was any more

the grade structure. As a result of this study it was found first is the place selected for the original study 675 civilian supervisors' spaces could be removed and 79 positions in the civilian personnel office could be abolished.

As a result of this test, directions have been issued to conduct an organizational and classification survey of all civilian grades throughout the United States. Civilian positions and responsibilities will be reviewed to establish the proper grade in the high level, improve organizational structure, and eliminate leveling of supervisory positions.

### Savings Increase Combat Forces

\*During fiscal 1954 (ending June 30, 1954), the Air Force increased forces in being by activating nine combat wings, eight air transport squadrons, 10 air refueling squadrons, and a number of miscellaneous flying support units. In addition, there was an expansion of the North American air defense net, an increase in NATO support, the establishment of 20 additional operating bases and the construction of combat-ready status of bases in Korea.

Civilian personnel authorizations, including those assigned to the Mutual Defense Assistance Program, decreased from 597,007 on June 30, 1971, to 334,342 on June 30, 1974. Military personnel authorizations during the same decreased from 951,627 to 555,394 in spite of increases in forces in being and overseas workload. The Air Force was able to accomplish these facts largely by achieving the reductions above and channeling the manning wrongs into combat forces. Reductions in stateside, overseas and those areas required to meet the additional combat authorization have served to partially offset large deficits now attributable for fiscal years 1975 and 1977.

The Air Force sponsored a review of authorizations by major commands. This program was successful, yielding voluntary reductions of 10,746 space authorizations. Approximately 15,000 authorization reductions were gained by workload adjustments; efforts are more AF commands<sup>11</sup>—from the Quarterly Program Report on Manpower and Personnel Control, USAF.

As a result of the actions taken by the Air Force in calendar year 1993, the military strength was reduced from a high of approximately 950,000 as of Aug. 14, 1951, to approximately 917,000 as of Dec. 31, 1994. The civilian strength was reduced from a high of approximately 316,000 on Feb. 1, 1993 to approximately 210,000 on Dec. 31, 1995. Now that we have shaken down to a firm base we are beginning to lower the 955,400 military figure for the end of fiscal 1994 and we have opened our recruiting process so that the new people we are going to add will be in the civilian strength. Shortage of personnel at the present time where shortages will develop by the end of fiscal 1995 and fiscal 1996, unless arrangements are reached, such as

As a writer of information, the military strength of the Air Force has grown back as of Aug 15, 1974, to approximately 937,000 and the civilian strength to approximately 283,000.

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(To be continued)

AVIATION WEEK, September 21, 1988

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